A WOODED ISLET.

MISSOURI

BOTANICAL GARDEN.

TWENTIETH ANNUAL REPORT.

ST. LOUIS, MO.:
PUBLISHED BY THE BOARD OF TRUSTEES.
1909.

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**Ex-Officio.*

[1] Elected Mayor of the City of St. Louis in April, 1909, to succeed Rolla Wells, who had held that office for eight years.

[2] Elected President of the Board of Public Schools of St. Louis in October, 1909, to succeed Henry C. Garneau, who had held that office for one year.

[3] Elected President of the Academy of Science of St. Louis in January, 1909, to succeed Calvin M. Woodward, who had held that office for two years.

PREFACE.

Under direction of the Board of Trustees, the twentieth annual report of the Missouri Botanical Garden is presented to the public.

The nineteenth report was issued November 9, 1908, but the following papers contained in it had been previously issued in separate form at the dates indicated:—Bessey, The Florida Strangling Figs, March 4; Sargent, Crataegus in Missouri, July 2.

As in the tenth report, an index to the contents of the last ten volumes has been included in the present volume.

These reports are sent to scientific institutions and journals, in exchange for publications and specimens desirable for the library, herbarium or living collections of the Garden. So far as is possible, reprints of the botanical articles they contain are sent to botanists occupied with a study of the subjects to which they pertain.

Any of the Garden publications not out of print may be purchased, at approximately the cost of publication, from Messrs. R. Friedländer & Sohn, Berlin, Germany; W. Wesley & Son, London, England; or the undersigned.

WILLIAM TRELEASE.

ST. LOUIS, MO., November 1, 1909.

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AS NATURE DOES.

REPORTS FOR THE YEAR 1908.

REPORT OF THE OFFICERS OF THE BOARD.

SUBMITTED TO THE TRUSTEES JANUARY 13, 1909.

To the Board of Trustees of the Missouri Botanical Garden:

We submit for your consideration the financial results for the year ending December 31, 1908.

We are able to announce a still further increase of $6,842.46 in the rental income for the year 1908, over that of the year 1907. The losses by vacancies were $958.75, and the loss of rentals through inability to collect was only $322.50,—less than one-fourth of 1% of the total earnings, which is a remarkably small loss considering the financial depression during the past year.

We suffered quite a serious loss by the June flood in the collapse of two five-story buildings fronting on the Levee between Olive and Pine Streets, one of the buildings being totally destroyed and the other damaged to such an extent that it became necessary to wreck it down to the first floor. They were reconstructed into substantial two-story warehouses, and have been leased for a term of years at $1,320.00 per year, which is $120.00 more than the old five-story buildings yielded. Other buildings were slightly damaged, entailing a total expense of $6,551.25.

All the buildings of the Board are occupied except two valuable stores at the southeast corner of Washington and Seventh Street, which were vacated on January 1st, at the expiration of leases made five years ago on about one-half the present rental values. We are now negotiating with several parties for new leases, which, if made shortly at the rentals asked, will increase our revenue for the year 1909 at least $10,000.00 over that of last year.

We have disposed of 65 feet of residence property on Flora Boulevard for the sum of $4,920.00.

We have during the past summer graded a large tract of land between Grand and Tower Grove Avenues and Shaw and McRee Avenues, at a cost of $21,851.43, and have thus placed 16,000 front feet of very desirable residence property in condition to be disposed of. The expenditure has greatly improved the appearance of the entire tract of about 100 acres, and the results have already been felt in the increased demand for abutting property so that we hope to be able in the spring to dispose of a portion if not all of the tract to a syndicate or to builders.

We have, as usual, been called upon for large expenditures for street improvements, as follows; the amounts having been charged to real estate as betterments.

Thurman Avenue	Paving	$ 1,823.79
Old Manchester Road	Paving	20,342.19
McRee Avenue	Paving	4,359.91
Tower Grove Avenue	Sidewalk	534.24
City Block 4941	Alley	1,393.28
		$28,453.41

The demands for street improvements will call for additional expenditures during the year 1909 estimated as follows:

Shaw Avenue	3,112 front feet	$18,672.00
Lawrence Street	350 front feet	1,800.00
Klemm Avenue	2,000 front feet	10,000.00
Vandeventer Avenue	2,000 front feet	8,000.00
		$38,472.00

We have about completed a large addition and extension to the library and office building (the old Shaw residence removed from Seventh and Locust Streets) in the Garden grounds and fronting on Tower Grove Avenue; it is an imposing and well built fire-proof structure, three stories in height, and an ornament to the Garden. The total cost of the improvement will be about $54,000.00, of which $41,014.00 has already been paid. No other expenditures have been made at the Garden other than for its maintenance, at a total cost of $47,000.00.

The following amounts have been credited to the Stock Account for the year:—

Library	$ 5,638.84
Herbarium	3,558.45
	$9,197.29

The annual bequests made by Mr. Shaw in his will have been carried out with the exception of the Trustees' Banquet which was not given, but the amount designated, $1,000.00, has been charged against the income to be used at some future time.

RECEIPTS.

Receipts on account of rentals	$134,759.04	
Interest and dividends	2,641.81	
Garden pasturage above expense	2.55	
Garden handbook sales	160.50	
Publication sales	7.37	
Garden sales, tuition, etc.	69.00	
Insurance, loss by fire	331.85	
Total income receipts		$137,972.12
Sales of real estate under decree of court	$ 4,920.00	
Stocks, bonds and certificates	61,236.94	
Shaw School of Botany, rent	3,900.00	70,056.94
Total receipts		$208,029.06
Cash on hand December 31, 1907		7,017.10
		$215,046.16

DISBURSEMENTS.

Garden Account,			
Labor pay-roll	$21,471.81		
Students' pay-roll	2,115.72		
Office assistance	1,462.50	$25,050.03	
Fuel		2,209.94	
Water		493.00	
Repairs and supplies		1,844.85	
Stable and implements		222.12	
Plants and seeds		432.47	$30,252.41
Herbarium Account,			
Salaries		1,283.10	
Fuel		291.09	
Current expenditures		1,755.17	3,329.36
Library Account,			
Salaries		2,014.70	
Fuel		338.14	
Current expenditures		2,772.06	5,124.90
Carried forward			$38,706.67

Brought forward		$38,706.67
Office Account,		
Salaries	$5,168.09	
Fuel	329.06	
Current expenditures	996.11	6,493.26
Research Account,		
Salaries	837.42	
Current expenditures	88.98	926.40
Scholarship Account,		
Instruction	575.00	
Care of Lodge (January to March) . . .	60.00	
Fuel	46.38	
Current expenditures	192.29	873.67
Total maintenance		$47,000.00
Garden Improvement Account,		
Library building	38,990.50	
Boiler	1,349.70	
Roadway	103.39	40,443.59
Total amount expended on the Garden		$87,443.59
Publication Account,		
Nineteenth annual report	2,155.00	
Garden handbook	578.50	2,733.50
Property Account,		
State, school, city and sprinkling taxes . .	36,869.49	
Streets, sidewalks and sewers	51,026.34	
Insurance	4,000.38	
Repairs	7,625.73	
Improvements	558.67	
Flood repairs	6,551.25	
Repairs and loss by fire	331.85	106,963.71
Bequests,		
Annual Flower Sermon	200.00	
Annual Flower Show	267.00	
Annual Gardeners' Banquet	451.95	918.95
Sundries,		
Office expenses	6,352.44	
Legal and professional expenses	2,584.65	
Commission	78.98	9,016.07
Shaw School of Botany, rents		3,900.00
Total disbursements		$210,975.82
Cash on hand December 31, 1908 . .		4,070.34
		$215,046.16

Respectfully submitted,

R. J. LACKLAND, President.

Attest:

A. D CUNNINGHAM, Secretary.

DWARF SUMACH, RHUS MICHAUXII.

TWENTIETH ANNUAL REPORT OF THE DIRECTOR.

SUBMITTED TO THE TRUSTEES JANUARY 13, 1909.

To the Board of Trustees of the Missouri Botanical Garden:

The following report on the Missouri Botanical Garden and the School of Botany therewith connected is respectfully submitted, in compliance with your rules.

The completion of the twentieth fiscal year of the Board's administration (the first year comprising the last four months, only, of the calendar year 1889), causes me to make this report generally retrospective, in addition to reporting in detail on the year just closed. For comparison, apart from the detailed statement annually submitted and published in the Report of the Garden, special reference is made to the first volume of the Report,* which gives at length the earlier history of the establishment; to the eighth,† tenth ‡ and fifteenth § administrative reports, which are comparative; and to the seventeenth¶ report of the Officers of the Board, which passes in review the years 1889 to 1904.

In addition to the declaration of purposes in Henry Shaw's will,*[1] in the deed conveying certain property to Washington University for the support of the School of Botany†[1] and the acceptance of the same by the University authorities,‡[1] and in the program outlined for the School of Botany when opened,§[1] the policy of the Board and the plans of the Director have been set forth at some length, though necessarily in general terms, in the first, eighth, and seventeenth administrative reports.*[2] Year by year during the two decades now closed, these purposes and policies have been passed in thoughtful

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* Rept. Mo. Bot. Gard. **1.** (1890).
† *l. c.* **8:** 12–50. (1897).
‡ *l. c.* **10:** 12–34. (1899).
§ *l. c.* **15:** 13–37. (1904).
¶ *l. c.* **17:** 7–27. (1906).
*[1] *l. c.* **1:** 29–55. (1890).
†[1] *l. c.* **1:** 56–58.
‡[1] *l. c.* **1:** 59–62.
§[1] *l. c.* **1:** 63–83.
*[2] *l. c.* **1:** 92–98. **8:** 37–46. **17:** 23–24.

review. If, in any essential, they are unrealized, this has resulted from necessity rather than forgetfulness or disregard; but, through causes beyond the control of the Board or Director, the possibility of detailed realization still remains greatly limited. Apart from the maintenance of a public museum as a part of the Garden, no general feature of the plan has actually failed of development in a degree proportionate to the financial possibilities of the Board; and, small as individual accomplishments have been, because of the limited means that could be bent to them, a continued and continuing advance is observable in all.

Recapitulated briefly, in the language used ten years ago, the direct objects of the founder of the Garden are: the maintenance of a garden easily accessible to the public excepting on Sundays and holidays, for the cultivation, propagation and study of plants; the exchange of material; the equipment, maintenance and utilization of a museum, herbarium and library; the gathering about the institution of a corps of instructors and investigators, with suitable laboratory and instrumental equipment; the provision for public lectures from time to time; the prosecution of research in botany in the broadest sense, including vegetable physiology, the diseases and injuries of plants, and horticulture and other branches of science closely connected with these; and the instruction and training of gardeners. Correlated with these purposes is that of training botanists, entrusted to the School of Botany, in the closest possible affiliation with the Garden.

GARDENING.

Under the administration of the Trustees, ever since the task fell to them, the Garden has been kept open to the public in the way designated by its founder, and, though never above criticism, has been maintained with improving taste and attractiveness, and with an increasing variety of plants under cultivation.

The limitation of decorative gardening to an area fixed at the time when the Trustees assumed charge of the establishment, and susceptible of enlargement only by provisional

means or through entire re-arrangement of the grounds (for which, at some future time, plans are prepared in detail), necessarily prevents any considerable annual increase in the number of plants used for this purpose; but this restriction of their number has been met, year by year, by increase in their variety and attractiveness, by the adoption of purposeful combinations of species, contrasted groups of related forms by which attention may be centered on them in their general characters, and by the combination of this synoptical idea in a broader way with the plans for decorative effect, whenever this can be done. In the year just closed, therefore, the out-of-door decorative features have been little different from those reported a year since, except for changes in bedding design and substitutions in the plants employed in carrying it out. As for several years past, tulips formed the attractive feature of early spring, when the parterre was planted solidly with them, the collection of these bulbs comprising 229 species or varieties, represented by 23,750 individual plants. Later in the season, the same space was used for the presentation of a contrasted collection of the choicest lantana varieties, which, though for the most part too heavily beset with foliage for a proper balancing of their flowers, proved attractive as well as interesting and instructive. Through the interest of an amateur in the cultivation of cannas, Mr. L. D. Yager, of Alton, Illinois, the display of these showy plants has this year been doubled, and no feature of the Garden has been more admired, or more critically approved by specialists, than this collection of 160 varieties, represented by 560 massed plants. Chrysanthemums were again grown in large numbers, and through the fortnight beginning with November 9th, a tented display was made of 452 varieties, represented by 3,582 plants, many of them of unusually good size and quality.

The addition of twenty acres to the Garden in 1900* not only added nearly one-half to the original area of the grounds (44.7 acres), but made possible the realization of one of the early-declared policies of the Board, to present a segregated representation of the plants of the United States; of these

* Rept. Mo. Bot. Gard. **8**: 38. **11**: 14. **12**: 11. **14**: 14. **17**: 16.

about 1,150 species are now grown in a park-like synopsis that is yearly increasing in attractiveness and interest.

One of the most pressing needs of the Garden is that of additional plant houses, for the display as well as for the cultivation of plants which require shelter,—the number of which, as the smoke of the city increases, is destined to become greater year by year. During the past twenty years the original antiquated plant houses have been supplemented by a somewhat greater area of houses, either of good modern type and construction, or temporarily but adequately built for the propagation of plants. One such house was built in 1895 for the growth of vegetables and grapes under glass; and a similar house, covering 875 square feet of ground, originally built by Dr. von Schrenk for his personal use, has been transferred to the Garden recently for experimental purposes. The present ground area of plant houses is 33,055 square feet, and the area of propagating frames and pits is 5,866 square feet; but everywhere the plants are overcrowded, and such collections as that of *Agave* are suffering from inadequate housing.

Though two serious fires have occurred in the plant houses at the Garden, in 1902* and 1903,† the losses experienced were not only quickly made good but brought expressions of sympathy and gifts of plants from so many friends as to make it questionable whether the accidents were real misfortunes.

Plant and seed accessions for the year, aside from Garden propagations and collections, number 323 entries, comprising 10,044 plants or packets of seeds. Of these, 7,591, representing 277 of the entries and valued at $607.70, were presented or received by way of exchange, and 2,453, representing 44 entries, were bought, the Secretary's books showing an expenditure of $432.47 for such purchases and incident expense. The collections by Garden employees, apart from seeds gathered for exchange use, number 2,183 plants, valued at $177.21, and 101 packets of seeds, valued at $10.30. Garden propagations amount to 40,125 plants, valued at $2,808.75 and 6,860 seedlings, valued at $343.00.

The exchange seed list issued by the Garden last winter

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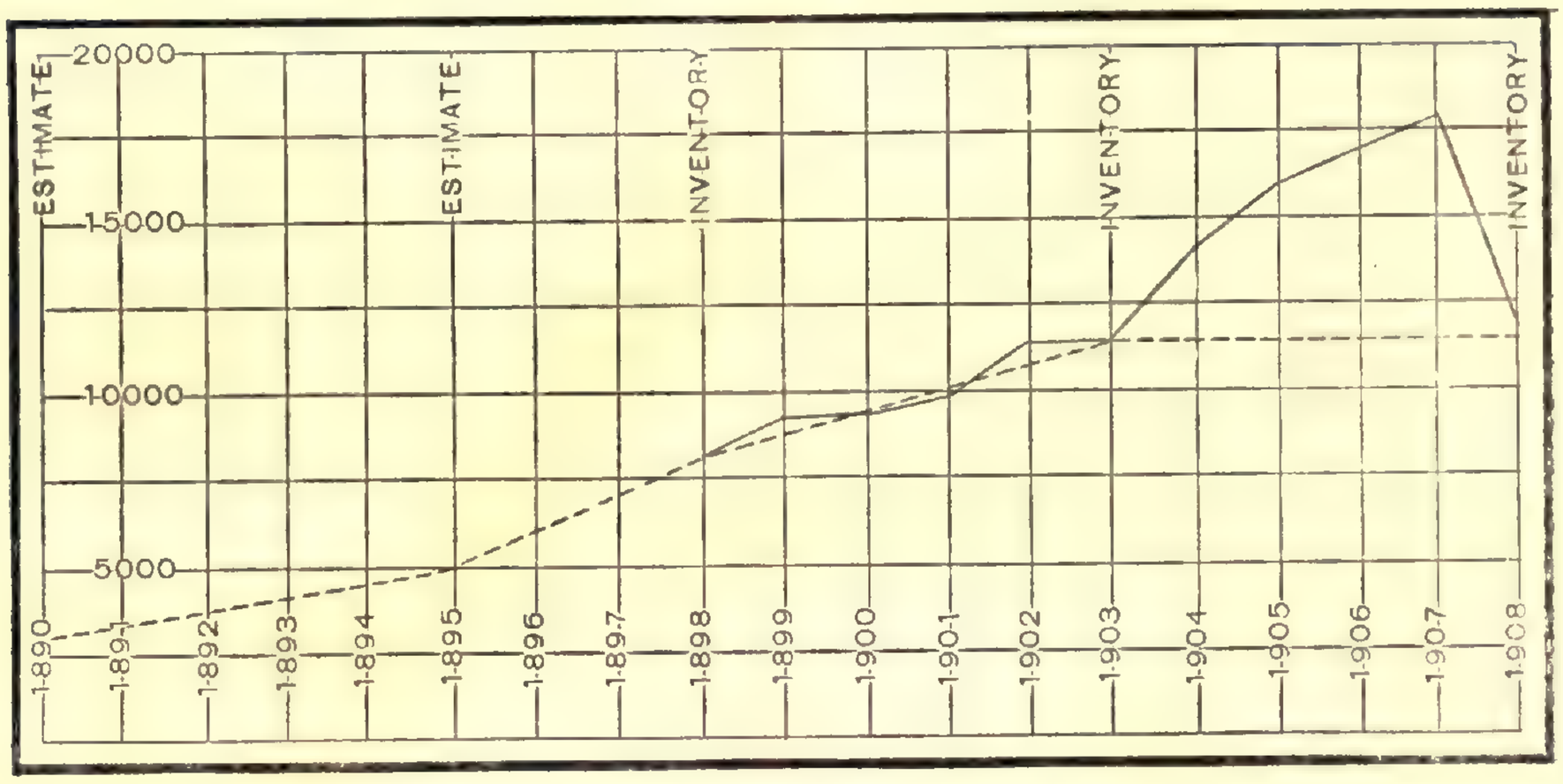
* Rept. Mo. Bot. Gard. **14**: 14. † *l. c.* **15**: 21.

includes 1,963 species or varieties; and 6,194 packets of these seeds, valued at $309.07 have been sent to correspondents. Living plants to the number of 217, valued at $22.90, have been distributed in like manner. Aside from these exchange distributions, 320 duplicate plants and 1,364 bedding plants removed from the grounds in autumn, or remaining unused on completion of the spring planting, were given to the public schools. The surplus chrysanthemum plants which remained fresh at the end of the November exhibition, and many cut flowers from it, were presented to hospitals and other charities, 180 plants having been so distributed.

DIAGRAM A.



SPECIES AND VARIETIES CULTIVATED

The plant records for the past year show that 1,080 species or varieties not cultivated in 1907 were added, and 719 lost or discarded,—a net gain of 361, bringing the nominal number in cultivation up to 18,277, in contrast with the 17,916 reported a year ago.* It appears from the appended diagram (A) that no period in the history of the Garden has been marked by so great progress in this direction as the four years from 1903 to 1907. A quinquennial inventory, however, shows that the number of forms cultivated to-day is only 11,464, essentially the same as five years ago (11,357), so that no actual pro-

* Rept. Mo. Bot. Gard. **19**: 13.

gress has been made in this direction. The difficulties of the plant recorder in ascertaining and entering the disappearance of each species dropped, were indicated in the last general summary;* but they have never proved so misleading as during this last period of merely apparent progress notwithstanding unusual efforts to increase the collection.

THE WEATHER.

Gardening is so closely governed by and dependent on climatic conditions that success or failure, either general or partial, is often distinctly in relation with the meteorology of a given year. Though hardly a season passes without a serious thunder-storm or hail or sleet storm, which leaves in its wake washed walks, broken or riven trees, or other ruined plants, the Garden has suffered from few really serious storms since its care was assumed by the Board. One cloud-burst, in July 1893, brought so heavy and rapid a downpour as to fill the parterre with water and convert the grounds at the north of it into a pond that became nearly waist-deep where dammed by the east and north walls of the Garden, notwithstanding the existence of drains which quickly remove the water of ordinary storms; yet little harm was done aside from denudation of the steeper walks†. Two hail storms of unusual severity, one in 1896‡ and the other in 1902, did serious damage to plants and glass houses. The only really notable storm, however, was the tornado of May, 1896,§ which in addition to injuring some of the buildings, wrecked a very large part of the trees of the Garden, destroying an effect of maturity that can be reproduced only in part and after the lapse of many years.

The ordinary facts of temperature and precipitation, which have been graphically presented year by year, are epitomized in the accompanying diagrams (B and C); those of the year 1908 being shown in separate diagrams (D and E). The data used for these are derived from the records of the St. Louis office of the Government Weather Bureau, with which the

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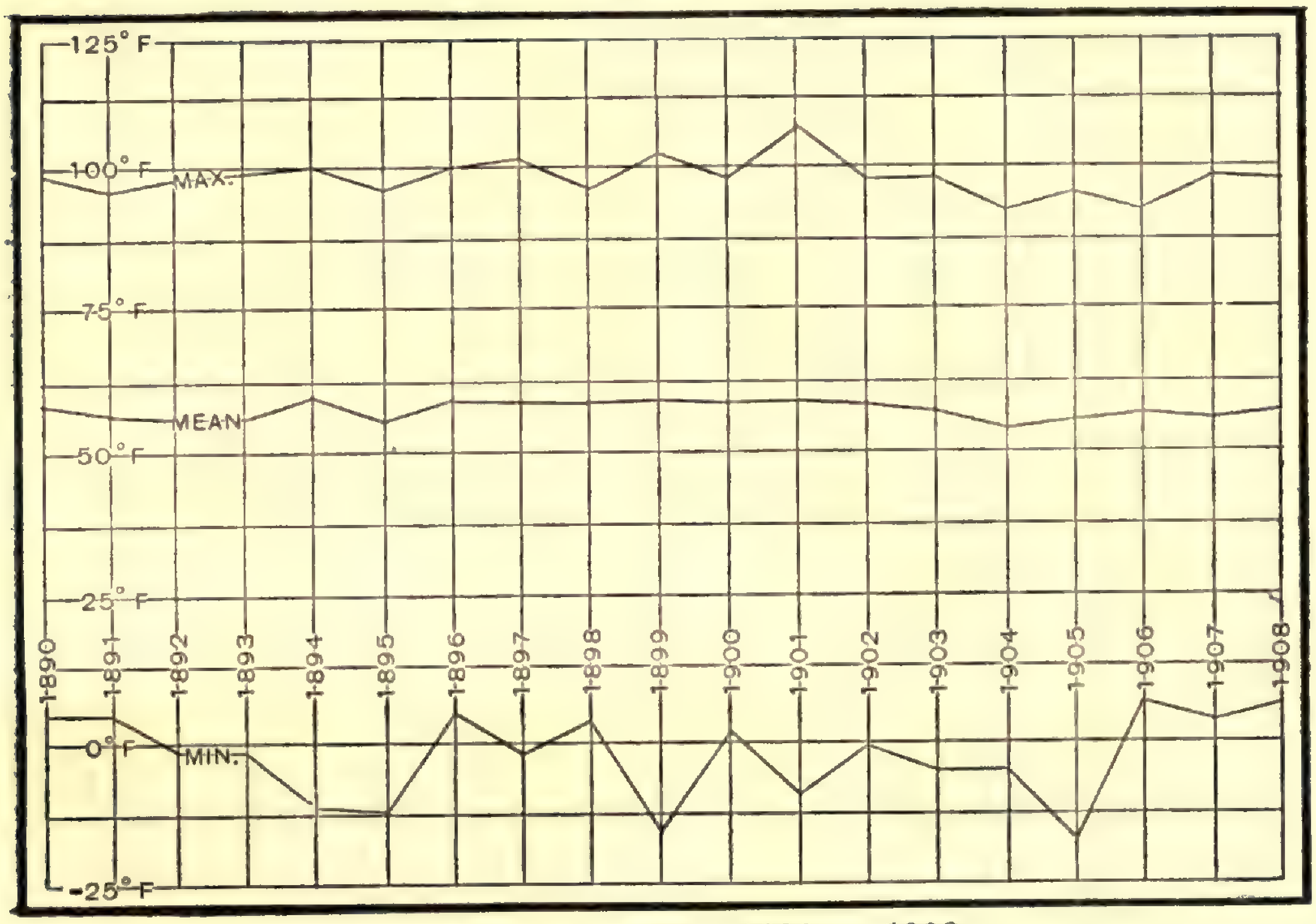
* Rept. Mo. Bot. Gard. **15**: 17.
† Rept. Mo. Bot. Gard. **5**: 14.
‡ *l. c.* **8**: 18.
§ *l. c.* **14**: 14.

readings at the Garden usually prove to be in close agreement though suburban conditions are almost invariably revealed

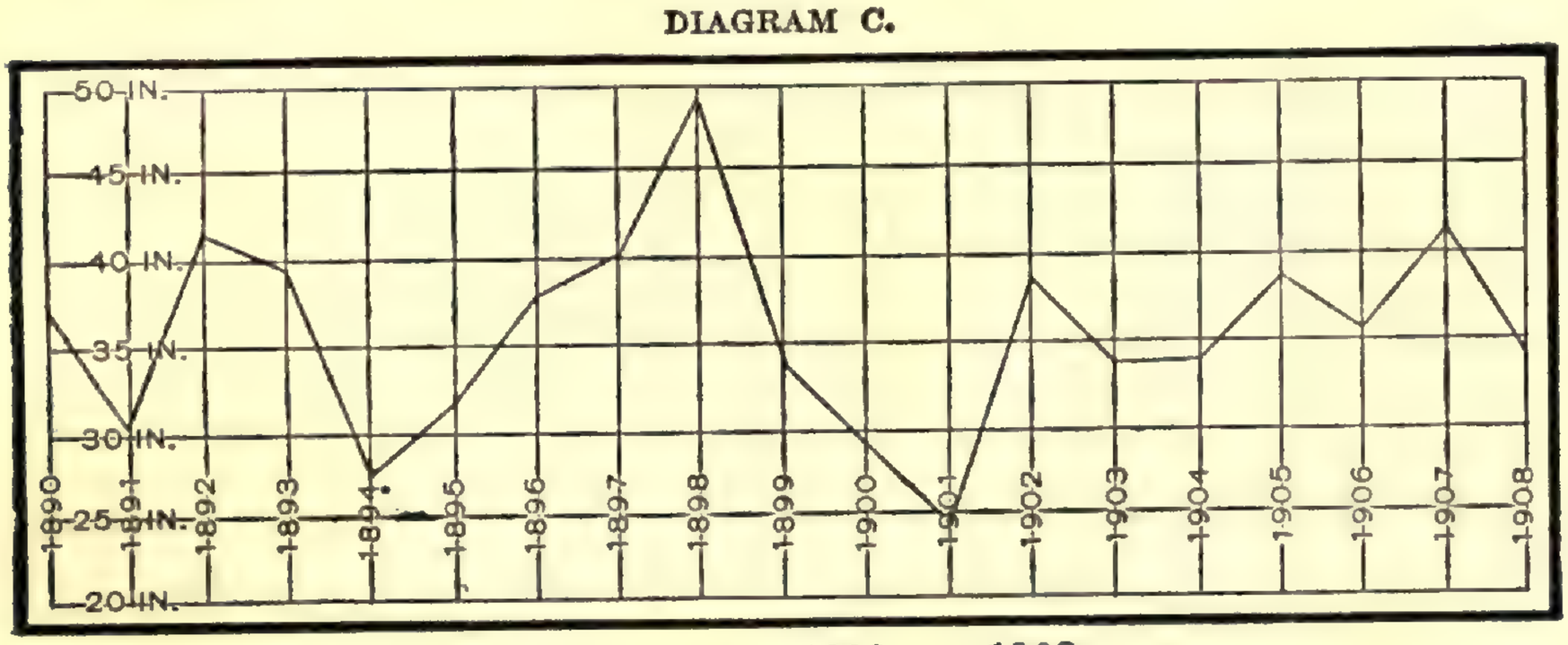
DIAGRAM B.



SHADE TEMPERATURE, 1890 TO 1908.

by greater temperature extremes at the Garden. A rather full analysis of the meteorology of St. Louis, given by Dr.

DIAGRAM C.

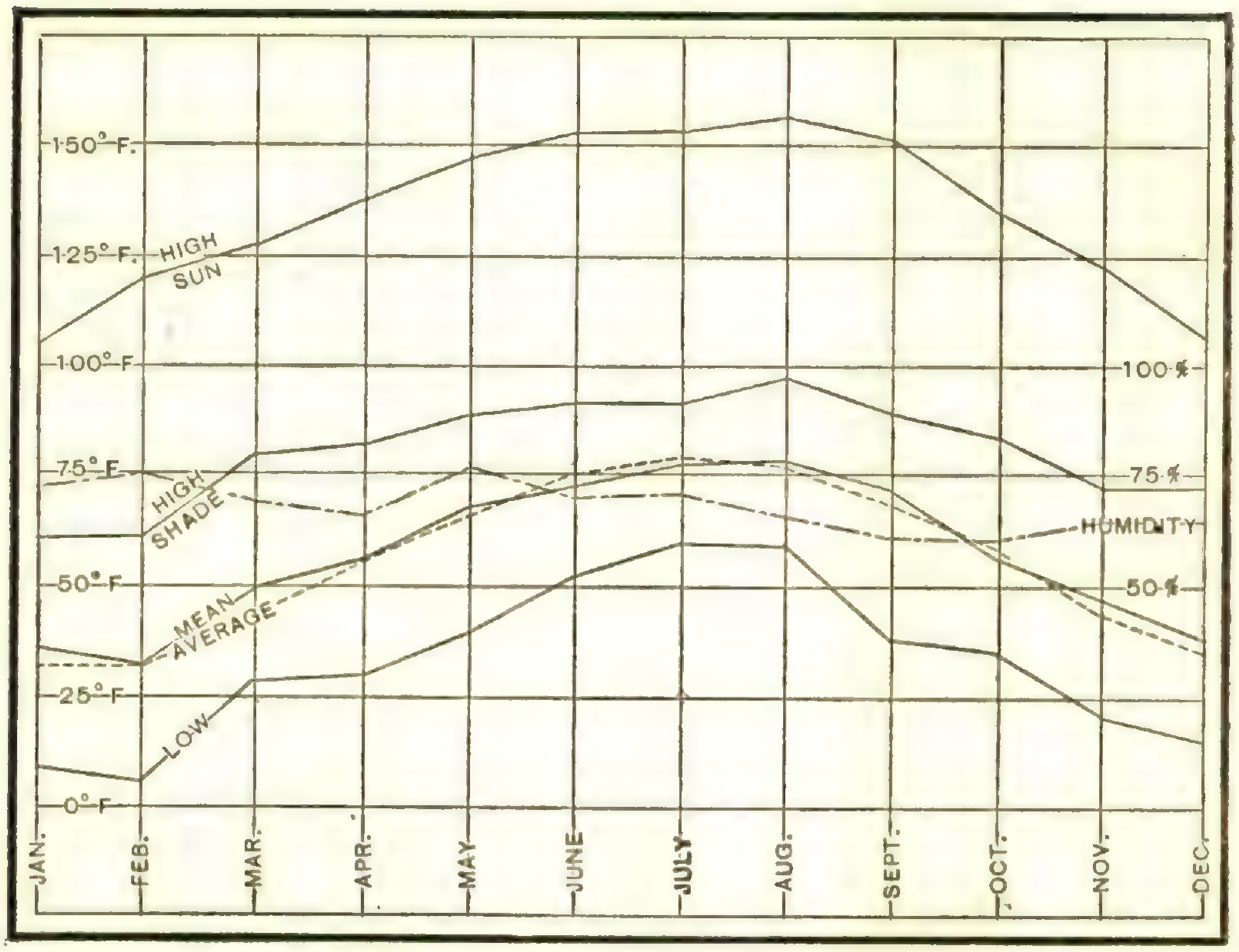


PRECIPITATION, 1890 TO 1908.

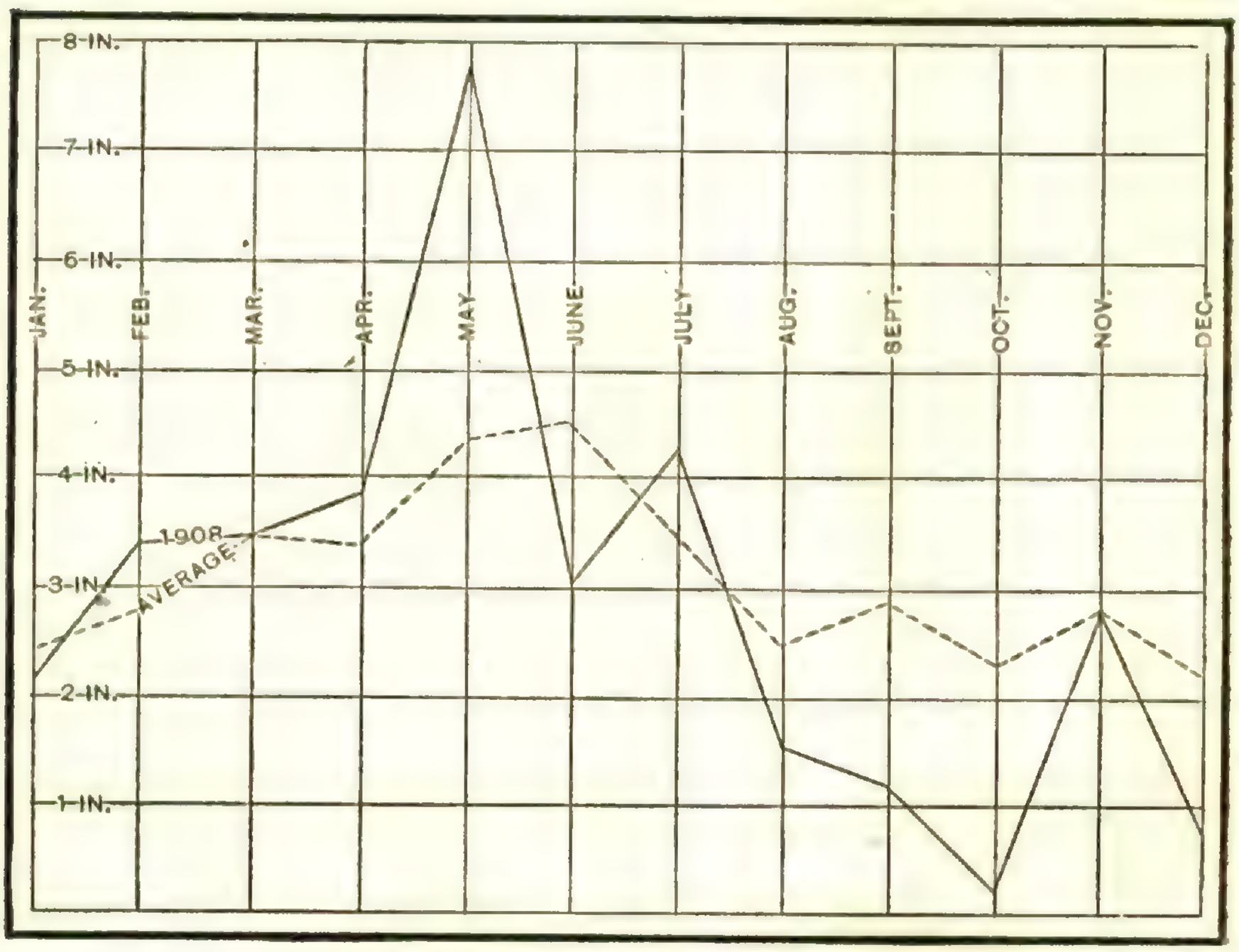
Hus in his study of the local flora in an earlier Report,* is available for comparison.

* Rept. Mo. Bot. Gard. **19**: 128. (1908).

DIAGRAMS D AND E.



D.—TEMPERATURE AND HUMIDITY, 1908.



E.—PRECIPITATION, 1908.

VISITORS.

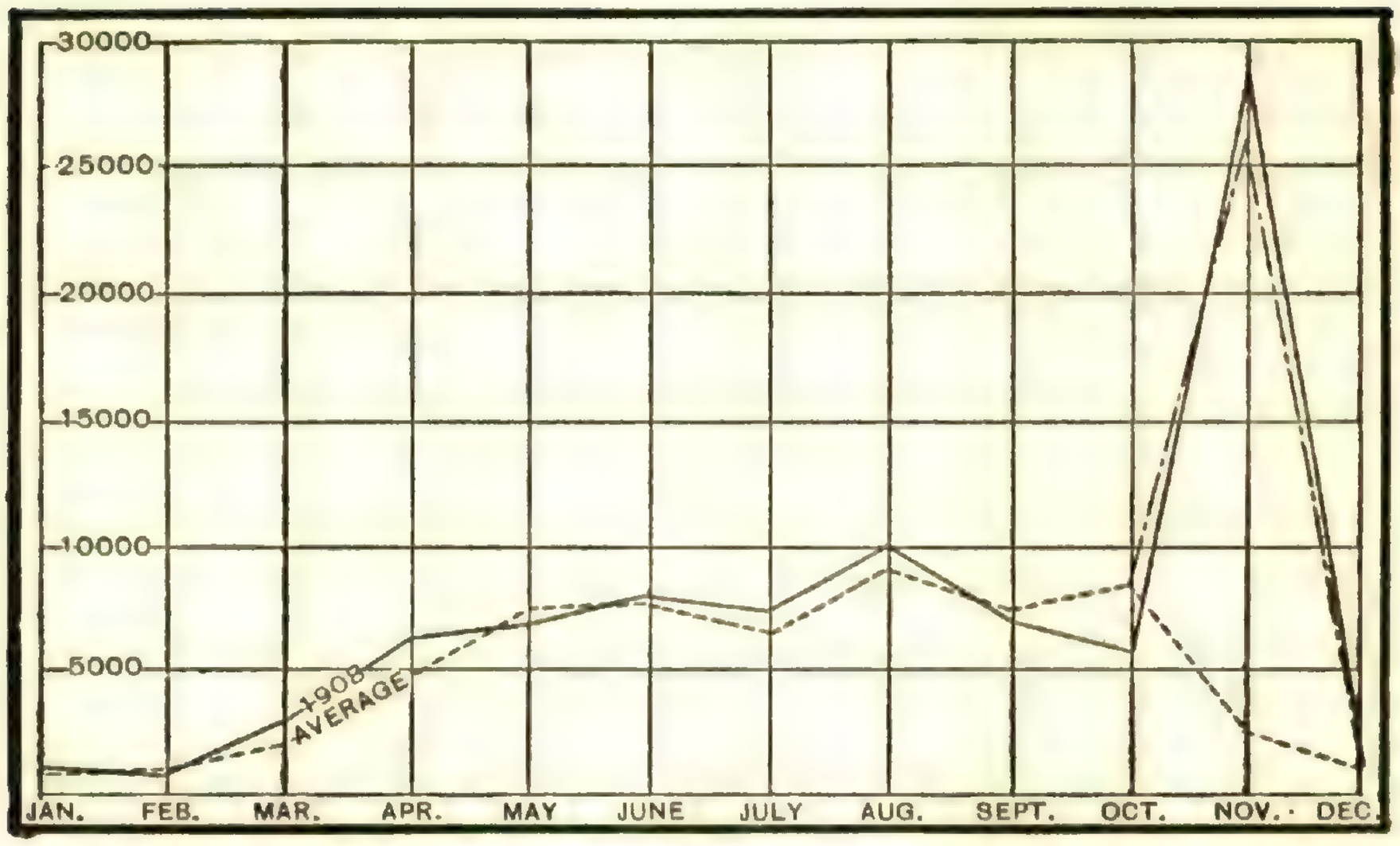
One index of the extent to which the Garden is meeting the wish of its founder to provide an attractive and interesting as well as an instructive collection of plants, for the public, is afforded by the number of visitors. In 1908 these numbered 118,465, of whom 16,659 were counted on the Sunday afternoon in June, and 17,312 on the Sunday afternoon in September, when the Garden was open under direction of Mr. Shaw's will. Of the remaining 84,494, who came on week days, some 3,000 were specially attracted by the tulips at the end of March, and 28,079 came to see the chrysanthemums in November. As in the two preceding years, Captain Robert McCulloch, of the United Railways Company, lighted the chrysanthemum tent during the fortnight of the exhibition, thus not only ensuring sufficient light on dull and stormy days, but making it possible once more to open this part of the Garden in the evening; thereby enabling 7,528 persons, many of whom could not have come in the daytime, to see the collection. The seasonal distribution of week-day visitors is graphically shown in the appended diagram (F) on which the average for earlier years (except 1904)* has also been shown, the November average for 1905–1907 inclusive being separately indicated in a broken line.

At the beginning of the year, a new and revised edition of the little Souvenir Handbook of the Garden was placed on sale at the gate, and 642 copies of it have been sold to visitors.

Sunday visitors who, according to the chance condition of the weather on the two open Sunday afternoons, fluctuate much in number from year to year, are recorded, and their ratio to the total is indicated, on a separate diagram (G). Though differing greatly year by year, this number appears to be gradually if only slightly increasing. During the time that the Garden has been under the care of the Trustees over half a million people have taken advantage of the privilege of visiting it on Sunday afforded by the special provision of

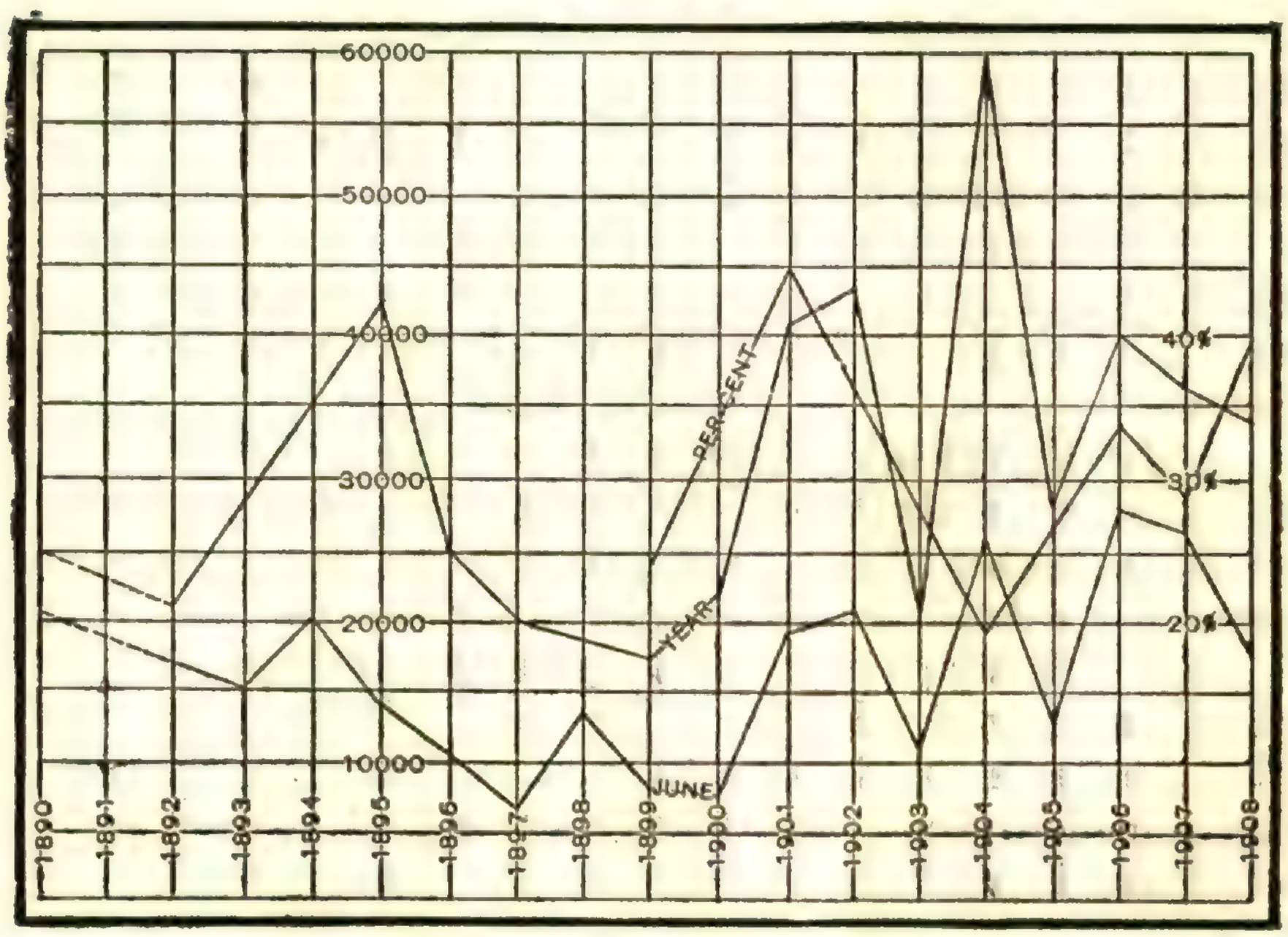
* Rept. Mo. Bot. Gard. 16: 17.

DIAGRAM F.



WEEK-DAY VISITORS, 1908.

DIAGRAM G.



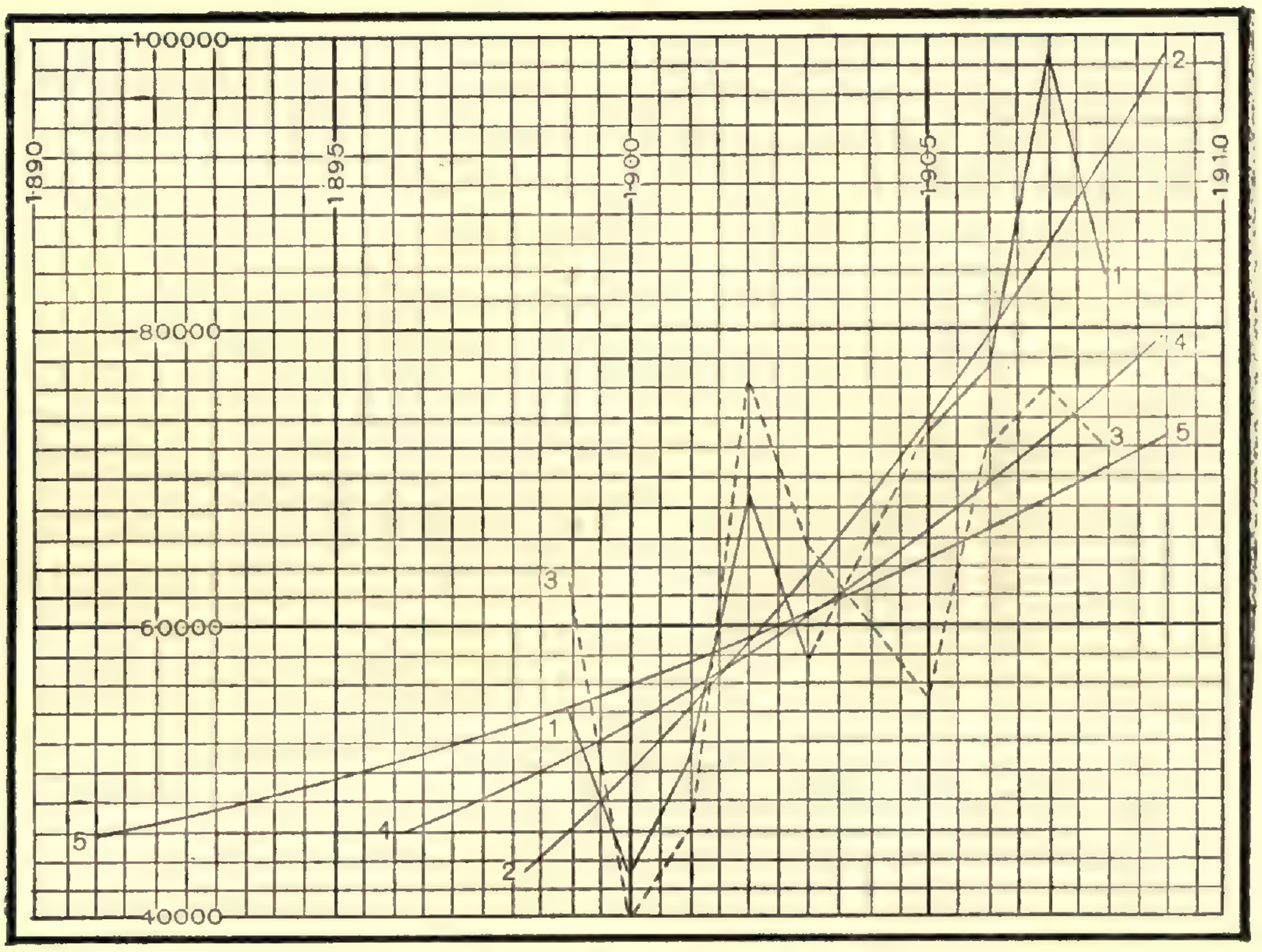
SUNDAY VISITORS, 1890 TO 1908.

IN CHRYSANTHEMUM TIME.

Mr. Shaw's will opening it on two Sunday afternoons each year.

The number of week-day visitors varies so largely, year by year, as to make an analysis of their yearly increase or decrease difficult; but an appended diagram (H), covering the period for which accurate records are available, shows in the line 1 (which is closely equivalent to the curve 2)* a decided average

DIAGRAM H.



INCREASE IN WEEK-DAY VISITORS.

yearly increase for the past decade. No small part of this is due to the chrysanthemum exhibitions, begun in 1905, and, to a far less extent, the tulip display, begun in 1904. As not directly affected by these, the July visitors—always fewer than in any other month of the summer season, and perhaps most indicative of the interest taken in the Garden by the average citizen—have been plotted on a ten-fold scale in the line 3 (roughly equivalent to the curve 4).* It is gratifying to

* The World's Fair year, 1904, being ignored

observe that even the latter shows a far more rapid proportionate rise than does Mr. Robert Moore's population curve for the city*, which is here plotted (5) on a scale of one-tenth, for comparison.

These curves seem to show that the week-day visitors have doubled in the past ten years, and that, apart from those who come to see the specially announced tulips and chrysanthemums, the Garden as a whole is not only holding its own in attractiveness in comparison with the growth of the city but is gaining in interest greatly beyond the increase in population; the July visitors having increased 47 per cent in a period during which the population has increased 25 per cent.

BUILDINGS.

During the entire period here passed in review, administrative, educational and research work at the Garden have been carried on with maximum economy of expenditure. When the Board assumed the care of the institution the Director's office was established in his residence and the dilapidated little museum collection which had been maintained in the building erected for such use in 1859 was replaced by the enlarged library and herbarium—for the original accommodation of which small rooms had been set apart when the building was planned. When the city residence of Mr. Shaw was removed to the Garden in 1891†, the offices, library and herbarium were transferred to it, and the museum building was again free; but before a collection could be displayed in it an overflow had begun, which has caused it to be again filled to the eaves with books and herbarium specimens, as in the case of the rebuilt city home. During this entire period, the only room set apart specifically for laboratory use has been a basement room of the museum building, which was equipped as a phyto-chemical laboratory in 1903‡, and as such has since been in constant use.

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* MS., 1906; data published in Journ. Ass. Engineering Socs. **33 : 299.**

† Rept. Mo. Bot. Gard. **3 : 7**, 15.

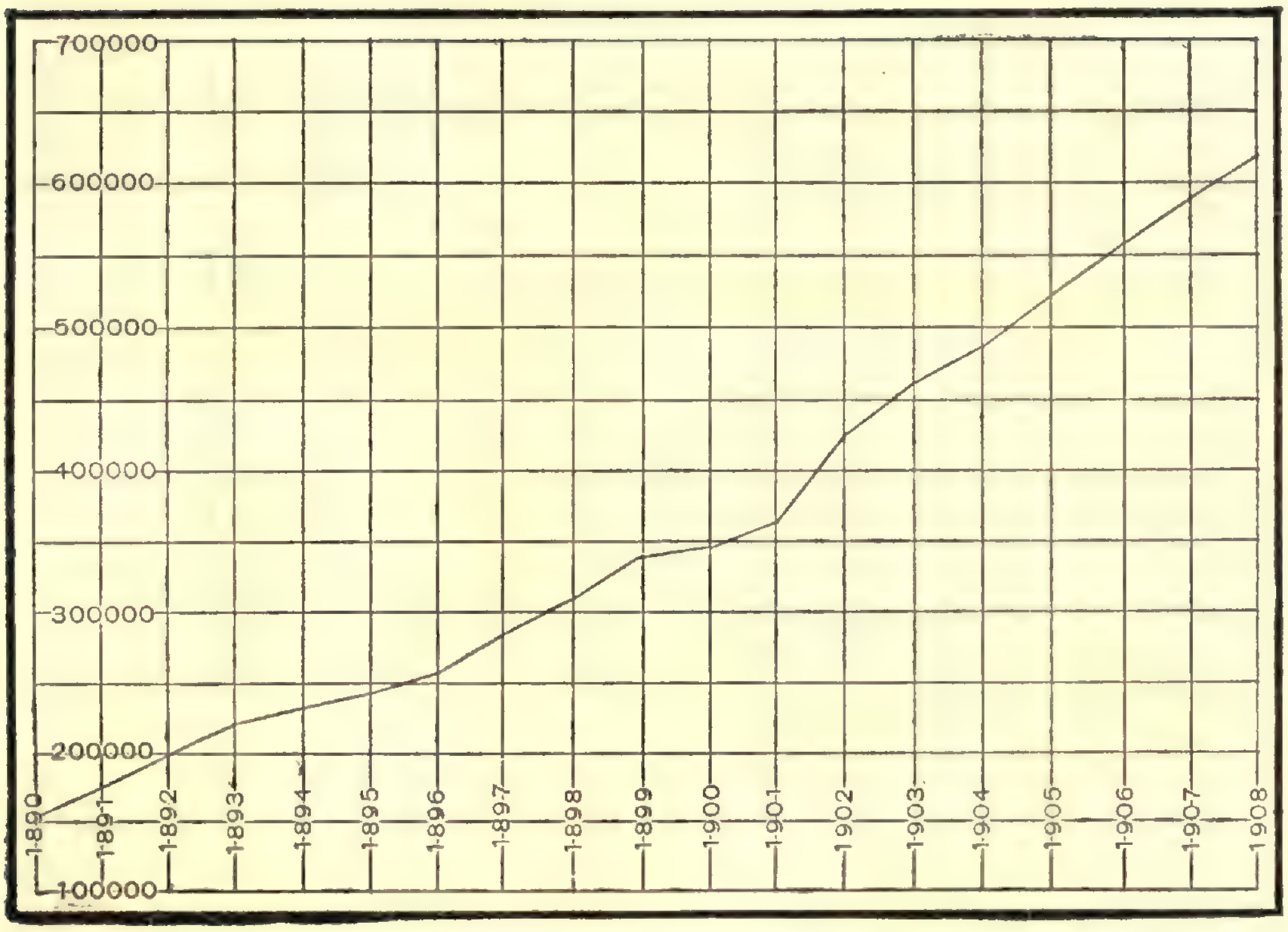
‡ Rept. Mo. Bot. Gard. **15 : 31. 16 :** 25.

The time having come when an increase in the buildings at the Garden was absolutely necessary, the first part of a quadrangle located in accordance with the plans of the landscape architects of the Board has been erected this season. The architectural motif is derived from the rebuilt city home of Mr. Shaw, which is made a part of the system. The building, of reinforced concrete, brick and terra-cotta construction, promises to afford safe and convenient housing for the library and herbarium for a number of years; and a part of it has been planned with reference to laboratory use.

THE HERBARIUM.

One of the essentials of a botanical establishment, a collection of dried plants representative not only of the general

DIAGRAM I.



INCREASE IN HERBARIUM.

floras of different regions, but of the various forms under which individual species occur, had sufficiently attracted Mr. Shaw's attention to lead him to purchase the nucleus for

such a collection many years before his death. To this, the Bernhardi herbarium of some 60,000 sheets,* have been added the much larger collection of Engelmann, the material accumulated through the life-long activity of several other prominent botanists, and the usual current sets made by professional collectors in this country, and, to a less extent, abroad. The growth of the herbarium, uniformly sustained through the last five years, is indicated by the accompanying diagram (I).

Incorporated additions for 1908 number 23,726 sheets of specimens, of which 8,984, mostly unmounted and valued at $449.20, were presented or received by way of exchange; 1,917, valued at $95.85, were collected by Garden employees; and 12,825 were purchased, the Secretary's books showing an expenditure of $1,322.30 for specimens, and material used in mounting them. In exchange for other specimens, 1,864 duplicates, valued at $93.20, and 3 mounted sheets, valued at 45 cts., were distributed to correspondents.

As a matter of probable future interest, it is here recorded that the Lindheimer duplicates of 1849 to 1851, referred to in earlier reports,† have been distributed as follows:—

New Mexico College of Agriculture and Mechanic Arts	Agricultural College, N. Mex.
University of New Mexico	Albuquerque, N. Mex.
University of Texas	Austin, Tex.
University of Arizona	Tucson, Ariz.
University of California	Berkeley, Calif.
K. Botanischer Garten	Dahlem-Berlin, Germany.
Biltmore Herbarium	Biltmore, N. C.
J. W. Blankinship	Bozeman, Mont.
Herbier Boissier	Chambésy-Geneva, Switzerland.
Jardin Botanique de l'Etat	Brussels, Belgium.
R. Botanic Garden	Sibpur-Calcutta, India.
South African Museum	Cape Town, Cape Colony.
Field Museum of Natural History	Chicago, Ill.
Botaniske Have	Copenhagen, Denmark.
Casimir de Candolle	Geneva, Switzerland.
Natal Botanic Gardens	Berea-Durban, Natal.
R. Botanic Garden	Edinburgh, Scotland.

* Rept. Mo. Bot. Gard. 1 : 93. 2 : 25. 3 : 15. 8 : 19.

† Rept. Mo. Bot. Gard. 18 : 123. 19 : 16.

Gray Herbarium	Cambridge, Mass.
R. Botanic Gardens	Kew, England.
British Museum (Natural History)	London, England.
Ugolino Martelli	Florence, Italy.
National Herbarium	South Yarra-Melbourne, Victoria.
Instituto Médico Nacional	City of Mexico.
Museo Nacional	City of Mexico.
K. Botanisches Museum	Munich, Bavaria, Germany.
Geological Survey of Canada	Ottawa, Canada.
University of Nevada	Reno, Nevada.
New York Botanical Garden	Bronx Park, New York City.
University of Oklahoma	Norman, Okla.
Muséum d'Histoire Naturelle	Paris, France.
Academy of Natural Sciences	Philadelphia, Pa.
University of Pennsylvania	Philadelphia, Pa.
Botanic Gardens	Singapore, Straits Settlements.
Jardin Impériale de Botanique	St. Petersburg, Russia.
Botanic Gardens	Sydney, N. S. Wales.
K. K. Naturhistorisches Hofmuseum	Vienna, Austria.
Baylor University	Waco, Tex.
Smithsonian Institution	Washington, D. C.

The present composition of the mounted herbarium is:—

The Engelmann Herbarium (all groups)			97,859 specimens.
The General Herbarium:—			
Higher plants.			
The J. J. Bernhardi Herbarium	61,338		
The Henry Eggert Herbarium*	23,495		
The J. H. Redfield Herbarium	16,447		
The Sturtevant and Smith Herbarium	7,446		
The Gustav Jermy Herbarium	5,118		
The A. W. Chapman Herbarium*	3,536		
The Julien Reverchon Herbarium*	17,210		
The Nicholas Riehl Herbarium	3,359		
The S. M. Tracy Herbarium	752		
Other specimens	333,199	471,900	specimens.
Thallophytes.			
The J. J. Bernhardi Herbarium*	610		
The Gustav Jermy Herbarium	1,659		
The S. M. Tracy Herbarium	4,312		
The Wm. Trelease Herbarium	11,000		
Other specimens	31,526	49,107	
Making a total of			618,866 specimens.
Valued at			$92,829.90†

* So far as yet incorporated.

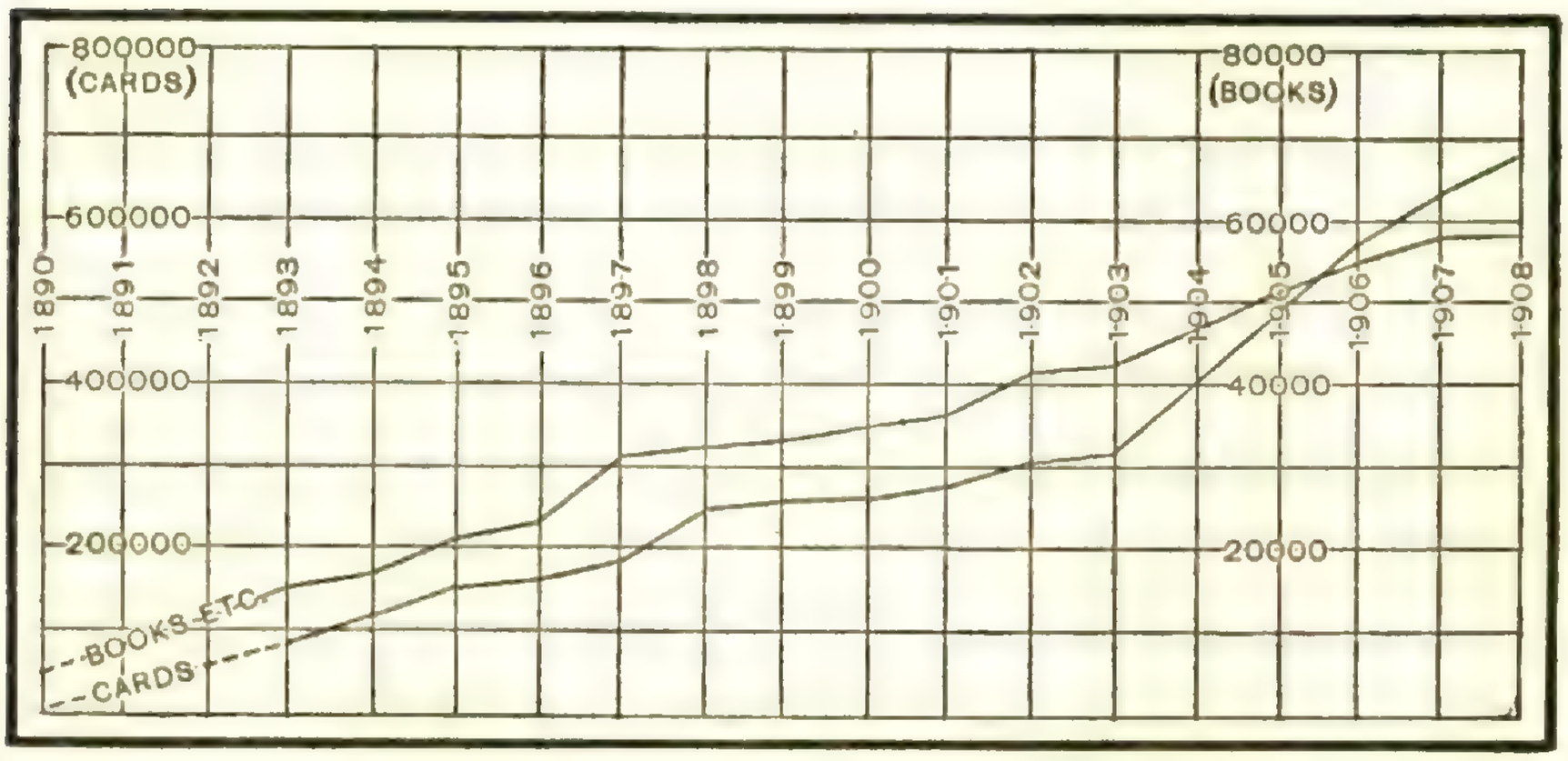
† This valuation at the rate of $15.00 per hundred mounted sheets.

Supplementing the herbarium and the shelved or incorporated exsiccatae which are here counted as a part of it,* the Garden possesses specimens of economic plant products, woods, seeds, etc., valued at $280.00, and 1,851 preparations for microscopic study, valued at $410.00, which have not received recent addition.†

THE LIBRARY.

As with the herbarium, Mr. Shaw had laid the foundation for a botanical library in a small but select collection of books

DIAGRAM J.



INCREASE IN LIBRARY.

bought many years before his death; and before the Garden came under the care of the Trustees, the library of Engelmann had been transferred to it. Though the funds available for purchasing books have necessarily been greatly limited, not a year has passed without the acquisition of choice and rare publications, and the exchange relations established and maintained with other publishing institutions have ensured the receipt of a large number of important serials without direct expenditure. The yearly details of the growth of the library from something less than 5,000 books and pamphlets,

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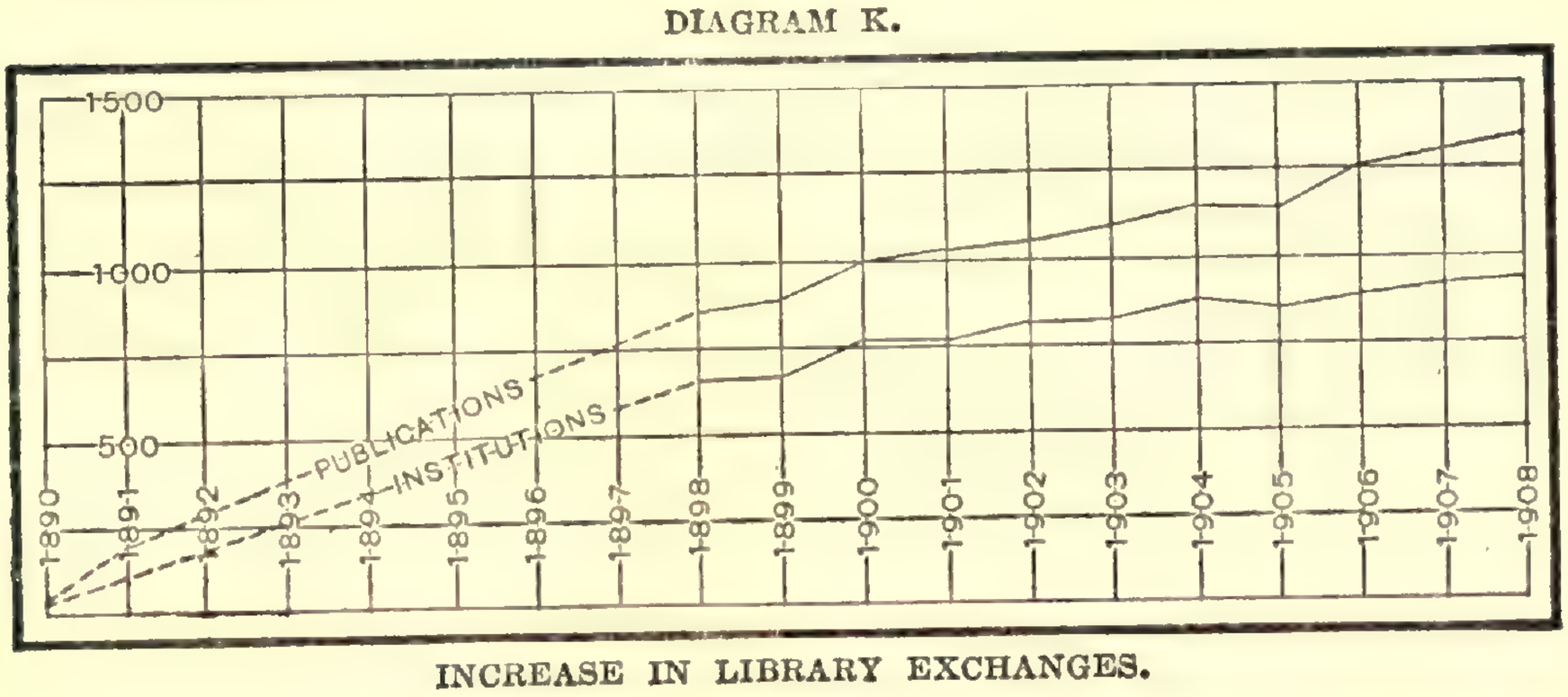
* See Rept. Mo. Bot. Gard. **16**: 21.

† See Rept. Mo. Bot. Gard. **18**: 20.

in 1889, to the present number, 58,538, are indicated in the accompanying diagram (J); rather more than the average increase being shown for the last five years.

In the year just closed, 1,289 books and 3,908 pamphlets have been added to the library; of these, 856 books, valued at $1,914.85, and 3,786 pamphlets, valued at $559.25, were presented or received in return for publications of the Garden; and 433 books and 122 pamphlets were bought, the Secretary's books showing an expenditure of $2,436.51 for purchases and binding. The customary attention has also been given to indexing publications in the library for certain features; and 43,923 new index cards have been incorporated, of which 33,433 were written by employees and the remainder purchased. The increase in cards is shown comparatively on diagram J; the great activity of the last five years being due to special effort in indexing the literature of floral ecology and seedlings.

DIAGRAM K.



INCREASE IN LIBRARY EXCHANGES.

The enumeration of books and pamphlets, in the yearly records of additions to the library, is necessarily nominal in that, when eventually bound, several thin numbers of a series are not infrequently joined together, thus reducing the number of volumes actually standing on the shelves, though without affecting their recorded valuation. The record of books and pamphlets has now been corrected by a recount, the total showing an apparent loss of 311 books and manuscripts and a gain of 616 pamphlets for the past year, although, as stated above, 1,289 books and 3,908 pamphlets have been

added. As now constituted, and after such revision, the library contains:—

Pamphlets	34,351				
Books	24,085				
	58,436, valued at				$91,283.39
Manuscripts:					
Engelmann, Notes and Sketches	60, valued at			$600.00	
Roetter, Sketches	1	"	"	100.00	
Shaw, Notes	5	"	"	100.00	
Sturtevant, Index Rerum	11	"	"	110.00	
Price, Bird and Insect Sketches	2	"	"	250.00	
Leconte, Insect Sketches	8	"	"	225.00	
Bay, Bibliotheca Riviniana	1	"	"	25.00	
Theses by Garden Pupils	6	"	"	6.00	
Theses by Graduate Students*	8	"	"	8.00	
	102	"	"		$1,424.00
Total	58,538	"	"		$92,707.39
Index cards	673,844	"	"		6,738.44
Total value of Library					99,445.83

When the Garden came under the care of the Board it was scientifically unproductive, and without affiliations. With the issue of its first Annual Report (1890), which was purely historical, relations with other establishments were inaugurated, and the publication in each subsequent year of a volume in large part devoted to scientific papers, has made it possible to extend these relations and to develop a systematic and mutually helpful exchange of publications, the growth of which is indicated on the accompanying diagram (K).

The serial publications now received number 1,452, of which 103 are bought, and 1,349, issued by 949 institutions or publishers, are received by way of exchange. After a careful revision of the list and elimination of such as have lapsed, this number is 36 in excess of that reported last year.†

* Deposited by Washington University.

† Rept. Mo. Bot. Gard. **19**: 18. Lists are to be found in the following Reports: **10**: 91. **15**: 98.

PICKEREL WEED, PONTEDERIA CORDATA.

RESEARCH AND THE USE OF FACILITIES.

One of the explicit purposes of the founder of the Garden is scientific investigation. The means at the disposal of the Board have thus far made it possible to devote to research but a very limited part of the time of persons whose principal employment has been in the necessary care and administration of the establishment. It is, therefore, with especial satisfaction that the attention of the Board is called to the publications of the Garden staff in the series of annual Reports, and to the lists of their scientific and horticultural papers in the eighth, tenth, and fifteenth volumes, as well as that prepared for the present Report.*

From the nature of the case, research effort at the Garden has been turned thus far almost wholly to such disconnected and limited subjects as have compelled attention, rather than to larger problems requiring consecutive investigation extending over a period of years. The latter plan, whenever it shall become possible of achievement, obviously offers our greatest opportunity, but, while awaiting such opportunity, lines of work specially favored by the equipment, character, and location of the Garden have been followed. Aside from the privilege of devoting some part of their time to such pursuits, which has been granted to capable employees, the expenses of field work have been assumed by the Board on a number of occasions. In addition to the scientific results which have been acquired through field exploration, the herbarium and plant-houses have been enriched to an extent at least equaling the expenditure. In considering future development of research work in botany, the necessity of organizing a permanent staff whenever the revenue of the Board shall make this possible is apparent, thereby making it practicable to co-ordinate such individual work as may be assigned to advanced students as contributions to the solution of larger scientific problems requiring continuous investigation. While awaiting this desirable increase in the staff of local workers, effort has been directed to securing an adequate

* Rept. Mo. Bot. Garden. **8**: 221–232. **10**: 85–90. **15**: 87–97.

equipment, with the result that the material resources of the Garden are already large and reasonably well balanced. From the beginning, the fixed policy has been to make all our resources freely available for the use of botanists who must of necessity prosecute their studies elsewhere, and to afford every possible facility to investigators who can spend even a short time at the Garden in rounding out their work. This service has been rendered without charge beyond the expense incident to transporting books and specimens. Inspection of the series of Garden Reports and of the publications of the national Bureau of Plant Industry, gives a partial indication of the extent to which the equipment has been thus utilized. In the year just closed 301 books have been loaned from the library, to 72 persons or institutions; and 19,348 sheets of herbarium specimens, to 31 borrowers.

By authorization of the Trustees, a botanical research table was maintained in the Marine Biological Laboratory at Wood's Hole for three years, and utilized by an appointee of the Garden; but it was found necessary to discontinue this provision.*

THE HENRY SHAW SCHOOL OF BOTANY.

In 1885, four years before the Garden passed under the care of the Board of Trustees, Mr. Shaw endowed a School of Botany in connection with Washington University and declared his intention to provide for its intimate relation with the Garden†,—an intention which he fully carried out.‡ The property devised, then yielding an annual income of something over $5,000.00 and guaranteed not to fall below $3,500.00 annually, though nominally an endowment of a school of botany, is virtually that of a chair of botany.

Through the assumption of a large part of the Director's salary by the Garden Board, in 1893§, it has been made possible for the University to secure adequate and capable associates to relieve him of the details of undergraduate instruction, while the facilities of the Garden have been fully

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* Rept. Mo. Bot. Gard. **4**: 16. **5**: 17. **6**: 16. **7**: 19. **8**: 22.
† *l. c.* **1**: 56–59. ‡ *l. c.* **1**: 36, second clause. § *l. c.* **5**: 21.

utilized in class work. An amplification of the scope of the chair of botany into that of a real school of botany rests logically on the specific authorization of Mr. Shaw's will in connection with enlargement of the research activities of the Garden. It is a matter for congratulation that the enormous burden of special taxation, which has thus far so greatly hampered the Trustees in every direction, is likely to be lifted within the next five or six years—through completion of the city improvements for which unproductive revenue property is taxable. It should be possible, then, to make the School of Botany in fact what it is now in name, within at most a decade. No extension of the activities of the Garden is likely to yield so large or significant results as are to be anticipated from a Faculty of botany devoted to research and guiding younger investigators in utilizing the Garden equipment.

While financial conditions have thus far made it impossible for the School of Botany to undertake much beyond meeting the undergraduate botanical needs of the University, these have been fully met. With the personal approval of Mr. Shaw, an evening course in medical bacteriology was conducted in the years 1888–9 and 1889–90,—paving the way for such courses in the medical schools of the city; and special laboratory and lecture instruction in various other branches of botany has been given from time to time. Applicants for graduate standing have also been given opportunity for such work as lay within their powers and the equipment of the University and the Garden; and, though few in number, the six persons who have earned the Master's degree and the nine who have earned the Doctor's degree, with botany as a major subject, have demonstrated by subsequent achievement the value of the training that they have received, even under existing conditions.

In the year just closed, the undergraduate work of the School of Botany has essentially repeated that of the preceding year.* At the opening of the current College year, Mr. Arno Nehrling was appointed to the position of Assistant, which Mr. W. A. Ruth had filled last year.

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* A list of electives offered, is given in Rept. Mo. Bot. Gard. **19**: 20.

The enrollment for the first term of 1908–9 was:—"Biology 1," 2; "Botany 1," 12; "Botany 7," 6; "Botany 11," 6;—a total of 26 students, of whom the two first noted give about equal time to botany and zoology, and the others take one full botanical course each. With the present term, in connection with the extension work of the University, for which the regular electives are opened, the School of Botany has resumed the practice of offering special courses of instruction to teachers and others not matriculated as candidates for degrees—begun in 1885* but discontinued by direction of the Advisory Board in 1893,† though occasional courses of the kind have been given by request in the intervening years.

At the last Commencement of Washington University, the degree of Doctor of Philosophy, with botany as a major study, was conferred upon Mr. Henri Hus, whose thesis is published in the last Report of the Garden.‡ There is now registered at the University one candidate for the Master's degree, with major work in botany.

GARDEN PUPILS.

In pursuance of an express provision by Mr. Shaw that instruction to garden pupils be attended to, and guided by memoranda left by him, though not incorporated in his will, the Trustees early established six scholarships for ensuring to the holders a broad education in the principles and practice of gardening, without expense.§ The prescribed work was subsequently opened to others on the payment of a nominal tuition fee.¶ One paying pupil is now enrolled.

The course of study, originally made to cover six years,*[1] was reduced to four years and published in detail in 1892,†[1] since which, aside from minor modifications and readjustments, it has been little changed. As now given, the course is as follows:—

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* Rept. Mo. Bot. Gard. **1**: 84.
† *l. c.* **5**: 22.
‡ *l. c.* **19**: 127–258. *pl. 13–20.*
§ *l. c.* **1**: 94.
¶ *l. c.* **6**: 21.
*[1] *l. c.* **1**: 95.
†[1] *l. c.* **4**: 17-18.

COURSE OF STUDY.

YEAR.	TERM.	STUDIES.					PER WEEK.
SECOND.	April to June.	Floriculture. 3 exercises weekly.		Orchard Culture. 1 exercise weekly.	Surveying. 2 exercises weekly.		6
	July to Sept.	Floriculture. 3		Book-Keeping. 1	Landscape Gardening 2		6
	Oct. to Dec.	Floriculture. 1	Economic Entomology. 2		Surveying. 1	Elementary Botany. 3	7
	Jan. to Mar.	Floriculture. 1	Economic Entomology. 2	Twigs of Woody Plants. 1		Elementary Botany. 3	7
THIRD.	April to June.	Vegetable Gardening 3	Economic Entomology. 2			Botany of Wild Flowers. 2	7
	July to Sept.		Economic Mycology. 1	Orchard Culture. 2	Landscape Gardening 1	Botany of Garden Flowers. 2	6
	Oct. to Dec.		Economic Mycology. 3	Garden Accounts. 1	Botany of Fruits. 2		6
	Jan. to Mar.		Economic Mycology. 3	Garden Accounts. 1		Botany of House Plants. 2	6
FOURTH.	April to June.		Forestry. 1		Surveying and Drainage. 3	Botany of Woody Plants. 2	6
	July to Sept.	Small Fruit Culture. 4			Botany of Weeds. 1	Botany of Vegetables 1	6
	Oct. to Dec.	Special Gardening 2	Forestry. 1	Book-Keeping. 1	Orchard Culture. 1	Vegetable Physiology 2	7
	Jan. to Mar.	Special Gardening 2	Forestry. 1	Botany of Ferns. 1	Botanical Geography 1	Vegetable Physiology 2	7

The 77 class exercises per week here tabulated (each extending over three months), may be grouped under subjects as follows:—

Gardening:			
Floriculture	8		
Vegetable gardening	3		
Fruit culture	8		
Forestry	3		
Landscape gardening	3		
Selected thesis work	4	29	
Surveying and drainage		6	
Bookkeeping and accounts		4	
Economic entomology		6	
Botany in its relation to gardening:			
General botany	8		
Botany of decorative plants	5		
Botany of hardy woody plants	3		
Botany of fruits	2		
Botany of vegetables	1		
Botany of weeds	1		
Botanical geography	1		
Economic mycology	7		
Vegetable physiology	4	32	77

All of the above subjects capable of being taught in the laboratory, the greenhouse, or the field, are so taught; and all of the theoretical instruction is expected to be practically tested in the performance of the manual work required of students.

By action of the Corporation of Washington University, the classes of the School of Botany are opened to garden pupils, who are also granted free instruction in entomology at the University; and by special permission they have been admitted occasionally to other college classes. Though they show as great differences in preparation, ability, and studiousness as other young people, the garden pupils in the main have been of excellent character, and, though a high-school education is not expected of them, a number have come to the Garden with such preliminary qualification, and as a rule they have stood well up in such college classes as they have entered,

although giving the greater part of their time and energy to garden manipulation and the direct study of this art.

Though the immediate purpose of the course has been to train practical gardeners, and a majority of those who have completed it are now successful gardeners or florists, several have assumed responsible positions in the care of parks or school grounds, others have gone into government botanico-horticultural work or forestry, two have succeeded to an unusual degree in professional landscape work, and two have become college teachers of horticulture.*

The past year has seen no change (aside from a slight readjustment of studies) in the work of garden pupils, and no changes have been made in the teaching force. An important change in conditions, in some respects regrettable, has been necessitated, however, by the removal of the building which has heretofore served as a home for the pupils. This building,—erected by Mr. Shaw opposite the entrance to Tower Grove Park, and rented during his life-time for use as a restaurant,—no longer fitting into the plans of the Garden, and being dilapidated, was removed in the spring of 1908. As it has not been found expedient to provide another building in which pupils may be lodged, the allowance of money carried by the scholarships has been increased by the amount formerly spent on the maintenance of the lodge, and the pupils now find lodgings at pleasure in the neighborhood of the Garden. Each scholarship, in addition to free tuition, now carries a money grant of $330.00 for the first year, and $380.00 for each of the remaining three years. Two pupils are expected to have completed the required work by March next, and an announcement has been issued, offering the vacated scholarships in accordance with the provisions made by the Board.

THE GARDEN STAFF.

If unusual attention be here drawn to the men who have been concerned with the operations of the Garden for the past two decades, warrant is to be found in the express injunction of its founder that the Director shall so employ his energies;

* See Rept. Mo. Bot. Gard. **17 : 21.**

that from year to year the institution shall grow up in efficiency in promoting the ends in view in its inception,* and the corollary that such efficiency must always result largely from his official associates. To them are due directly improvements in gardening methods and design, increase in the variety and attractiveness of plants cultivated, adaptation of this collection to the purposes of education and research, care of the enormously enlarged library and herbarium adequate to their preservation and utilization, and personal aid rendered to the hundreds of visitors and correspondents whose botanical and horticultural questions are answered each year. That few of these collaborators could be retained in positions commensurate with their maturing qualifications for filling them has been our misfortune rather than theirs, but it is gratifying to know that their services while here not only resulted in the specific ends contemplated, but have also largely contributed to their own advancement. In the year just closed, three such losses have been experienced. At its beginning Dr. Harris, who had served as librarian since 1904, withdrew, to devote his entire time to research work with the Carnegie Institution; and towards its end Dr. Hus, who had spent three years in experimental work at the Garden, accepted an instructorship in the botanical department of the University of Michigan. The position of Library Cataloguer which Miss Smoot had held efficiently for over a year was also relinquished in the autumn, and her duties, with responsible care of the library, have been assumed by Miss Cora Hogan, who had familiarized herself with them under Miss Smoot's direction during the earlier part of the year.

The professional activity of the Garden staff during the past five years is indicated in a list of publications to which reference has already been made, 107 of the 153 recorded titles being those of publications by employees or pupils of the institution.

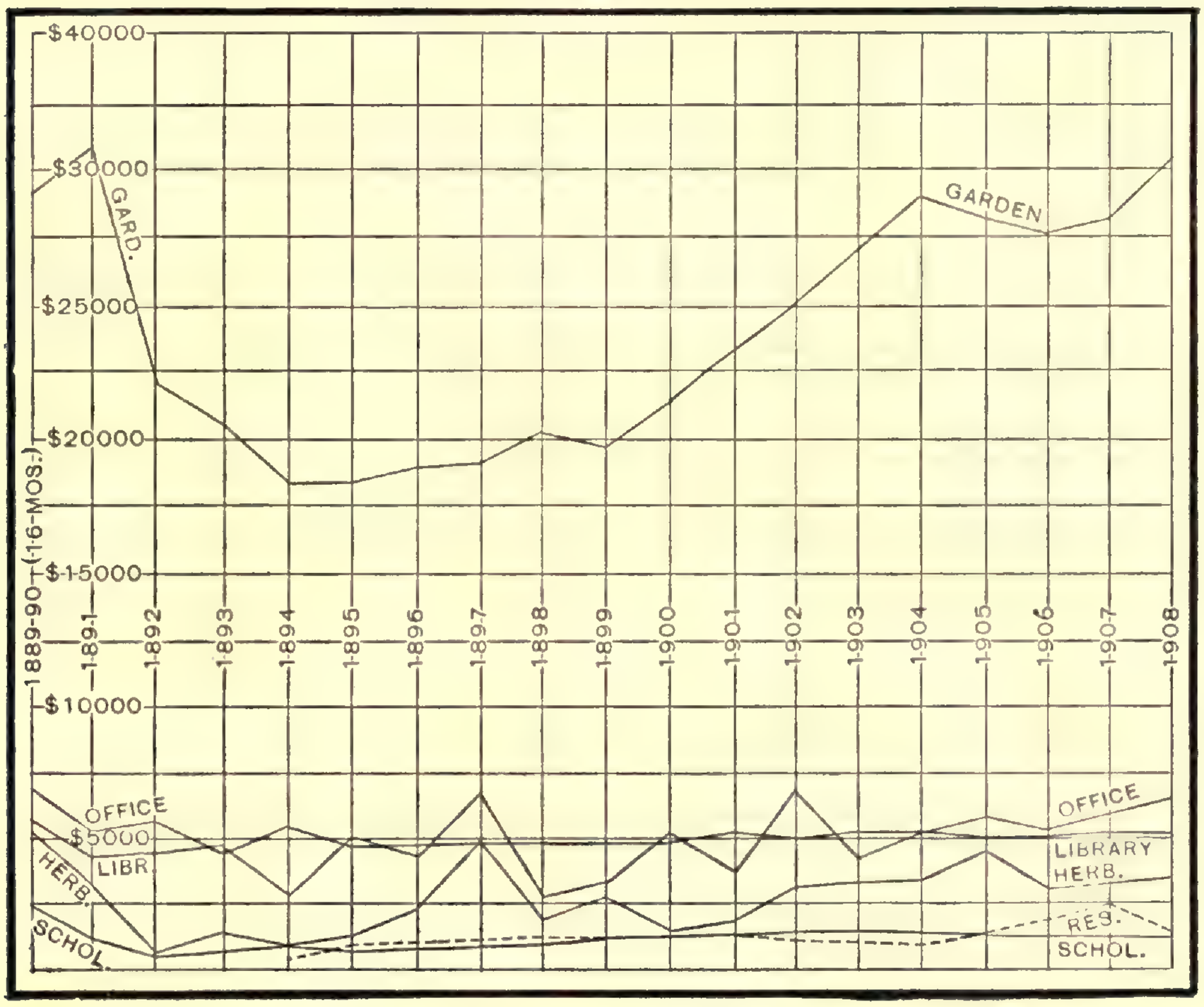
MAINTENANCE EXPENSE.

The expenditures for maintenance of all departments of the Garden, as tabulated in the annual statements of the Secretary,

* Rept. Mo. Bot. Gard. **1**: 35.

are shown comparatively in the appended diagram (L). The size and fluctuations in the largest item, for maintenance of the Garden itself, are especially instructive. During the first years of administration, owing to a large arrearage of deferred repairs, this item stood at about $30,000.00 a year, from which, by 1892, some $8,500.00 had been subtracted. The next two years saw a further reduction of about $1,700.00 each, chiefly through better organization and greater intelligence in

DIAGRAM L.



MAINTENANCE EXPENSES.

the help employed. The minimum, of $18,500.00 to $20,000.00, was maintained until 1899, notwithstanding the addition of a small plant house and provision for increased use of city water in 1894* and 1895,† and a considerable enlargement of the ordinary plant houses in 1897.‡ Further additions to the houses

* Rept. Mo. Bot. Gard. **6**:14.
† *l. c.* **7**: 14–16.
‡ *l. c.* **9**: 14.

in 1900* and 1902,† and the subsequent provision of several temporary houses for the growth of chrysanthemums, as well as the maintenance of the North American synopsis since 1901, the systematic collection of seeds for exchange since 1905,‡ and a progressive and notable increase in the wages paid gardeners during the past five years to meet increased cost of living, have caused the original scale of maintenance expenditure to be again reached. Indeed, it is only through undesirable economies that the $30,000.00 mark has not been considerably overstepped every year since 1904—as it must be from this time on.

In comparison with the necessarily increasing item for gardening, the other maintenance expenses have remained relatively small and constant. The expenditure on research and the instruction of garden pupils has changed little, year by year, except during the period of Dr. Harris' connection with the library, when the charging of a considerable part of his salary to the former account increased the figures. The amount spent on both library and herbarium have varied more, following greater or smaller additions of books and specimens. The maintenance of the building erected during the year just closed must appreciably increase the future fixed charges on both the library and the herbarium account, to which I hope to see laboratory expenses added. Because of the large proportion of the Director's salary so charged, the office expenses have always been relatively large, but they have run fairly uniformly until 1907, when a readjustment of this larger item carried them to a higher level, which they are likely to follow for some years with little change.

The relation of values to total expenditure on the library and herbarium would afford an interesting detailed study, but this is reserved for a future analysis. It is sufficient to state here that Mr. Shaw's purpose to establish exchange relations between the Garden and other scientific establishments—thus far effected mainly through the annual Report of the Garden, the seeds gathered for distribution to correspondents, and occasional accumulations of living plants and

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* *l. c.* **12 : 13.** † *l. c.* **14 : 14.**

‡ *l. c.* **17 : 29. 18 : 14. 19 : 12. 20 : 14.**

of herbarium specimens in duplicate—has resulted not only in making the activities of the Garden generally known, but also in material acquisition in excess of the cost of maintaining the exchanges.

SPECIAL TESTAMENTARY PROVISIONS.

Four annual events are specifically provided for in the will of Henry Shaw, in connection with the administration of the Garden: a banquet to the Trustees and invited guests; a banquet to the gardeners of the institution and invited florists, nurserymen and market gardeners; premiums or prizes to be offered at a flower show held in St. Louis; and a sermon on the wisdom and goodness of God as shown in the growth of flowers, fruits and other products of the vegetable kingdom. These have received the attention of the Board each year in a manner consonant with the purposes of the testator and calculated to advance the usefulness of the Garden, and have been mentioned in the administrative reports, year by year. In 1908 three of these specific bequests were utilized.

The flower sermon was preached in Christ Church Cathedral, St. Louis, on the morning of May 17th, by the Right Reverend E. W. Atwill, Bishop of West Missouri.

The Nineteenth Gardeners' banquet was given at the Mercantile Club on the evening of August 12th, 1908. There were present 140 persons, of whom about one-third were members of the American Apple Growers' Congress, which was then meeting in St. Louis. Under the provisions of Mr. Shaw's will, the Director of the Garden presided. Appropriate speeches were made by Captain George T. Lincoln, of Bentonville, Arkansas, President of the Arkansas Horticultural Society; Honorable Nikola Kaumanns, of Chicago, Imperial German Agricultural Attaché to the United States; Mr. C. H. Thompson, of the Garden; President L. A. Goodman of the American Pomological Society; Mr. Anton Oppermann, Secretary of the Gardeners' Association of St. Louis; Professor H. M. Whelpley, of Washington University, and Honorable Norman J. Colman, former United States Secretary of Agriculture.

The floral premiums were again awarded through the St. Louis Horticultural Society, at an exhibition held in St. Louis from the third to the sixth of November, 1908.

While it is probable that the money which has been spent on these annual events specially designated by the founder of the Garden would have been used for other purposes thought to be more immediately necessary, if the decision had rested with the administration of the institution, there is reason to believe that its general advancement has been sufficiently favored by them to show clearly the wisdom of Mr. Shaw in specifically providing for them.

Very respectfully,

WILLIAM TRELEASE,
Director.

EUROPEAN TREE AND HOUSE SPARROWS.

SCIENTIFIC PAPERS.

SUMMER BIRDS OF SHAW'S GARDEN.

BY OTTO WIDMANN.

During the summer of 1908 the writer noted on twenty visits to the Missouri Botanical Garden forty species of birds occurring under such circumstances that he is entitled to regard them as breeders in the Garden, although actual proof was not forthcoming in every case. Six species are classed as more or less regular visitors from near-by breeding grounds. This number does not include the score or more of transient visitants which in their bi-annual passage through our region stop at the Garden for a short time in spring and fall, nor those northern guests which come to us in fall, spend the winter with us, and leave us again in spring.

The total absence of those species which make their nests in old woodpecker holes or in natural cavities in trees is accounted for by the lack of nesting accommodations. Suitable bird boxes placed in different parts of the Garden would undoubtedly attract the Bluebird and the Purple Martin, probably also the Tufted Tit, Chickadee, Bewick's Wren, Great Crested Flycatcher and Screech Owl, all of them species which have begun to modify their old way of nesting by accepting artificial nesting sites. House Sparrows, which are likely to take possession of bird boxes intended for Martins, can easily be trained to let them alone by allowing them to hatch their eggs, but robbing them of their young ones before they are able to fly. Such bird boxes become at once abominable to the Sparrow tribe and are severely left alone. After the Martins have built their nest and begun to lay eggs Sparrows are kept off by the Martins themselves.

The Bluebird, feeding mainly on the ground, prefers a box not more than eight to ten feet from the ground, while the

House Sparrow does not care much for a nesting site so low down and easily reached by his greatest enemy, man. For Wrens, Chickadees and Titmice boxes with holes not more than 1¼-inch in diameter will do, while for Bluebirds and Martins 1½ to 2-inch holes are required, and for Screech Owls 2½-inch.

Too large a number of Bronzed Grackles and Blue Jays should not be tolerated, because it has been found that, where these species abound, very few tree-nesting birds of smaller size are reared, and in consequence such places are soon deserted by the smaller birds, among them some of our best songsters.

That the nest robbing boy is busy in even such sacred places as Shaw's Garden is evidenced by the fact that nests, known to be with nearly fully grown young one week, had been entirely removed the following week. The numerous hedges of dense shrubbery in the new part of the Garden, devoted to the North American Synopsis, have induced several species formerly little known in the Garden to nest therein, among them Bell's Vireo, Yellow Warbler, Maryland Yellowthroat, Chat, Traill's Flycatcher and Indigo Bunting. The meadow has attracted several pairs of Meadowlarks and Quails and the lake invites not only the Kingfisher to frequent visits, but also numbers of Swifts and Martins, which like to hunt over water when on cool days flying insects are scarce elsewhere. The ripening mulberries are an attraction for flocks of Cedarbirds in early June and the many beautiful flowers charm numbers of Hummingbirds later in summer after they have finished their domestic duties in other less frequented places.

Denizens.

QUAIL OR BOB-WHITE. *Colinus virginianus.*

From the first of May to the last of July the Bob-White is one of the birds oftenest heard, but seldom seen. It is at home in the Garden all the year round, but the loud, clear whistle "bob-white" is only heard during the breeding season. In winter we meet with a covey of a dozen or so in quiet places, where we may see them cross our way, one walking

behind the other from cover to cover, or coming upon them suddenly we may be startled by the loud whirring sound which they make when all take wing at once. Pairs are noticed in April and eggs are laid in May, but the cutting of the grass and weeds is likely to disturb them or, by ruining the already commenced brood, force them to make another attempt in some quiet spot.

The well-known Quail is a very handsome bird of a much variegated coloration, a reddish brown varied with black and white as the leading colors; the female is somewhat smaller with the general coloration subdued, less black and the white less pure. As the Quail is not only a handsome bird, but also a very beneficial one, destroying numbers of injurious insects in all stages of development all the year around, it deserves all the protection the farmer and gardener can give it.

MOURNING DOVE. *Zenaidura macroura.*

One pair of these lovely creatures made its home within the confines of the Garden. The doleful cooing of the male is one of the first sounds of Nature in early spring and is continued with more or less frequency throughout summer. The gentle and familiar Dove likes to nest near human habitations, knowing that good people are the best protection against its many enemies. The Doves of St. Louis and surrounding country have a particular liking for park-like gardens, where Spruces afford them secure nesting sites before deciduous trees become leafy enough to hide their frail structure. Arriving already paired about March 25, the peculiar far-reaching love-notes coo-coo, coo-coo betray their presence at once and the graceful airy evolutions of the playful birds are a fine treat to the Nature lover.

If the weather permits, arrangements for the first brood are made early in April and the one or two young ones leave the nest about the first of June, when preparations for a second brood are made. It seems that three broods are sometimes attempted, as nests with eggs have been found late in August and September, but as a rule Doves have deserted their breeding grounds by the middle of August, retiring to the wheat

stubble, where they pick up waste grain, but chiefly seeds of wild grasses and weeds with which the fields are rapidly overgrown after the grain has been removed.

SCREECH OWL. *Megascops asio.*

On its twilight excursions after beetles, moths, katydids and similar favorite dishes the Screech Owl appears on summer evenings on the lawn in front of Dr. Trelease's residence, much to the amusement of his family. Its soft doleful notes belong to the most delectable sounds in Nature and have nothing of the discordant screams, for which other members of the Owl family are renowned. Its name is, therefore, one of the many misnomers, for which we have to thank the early settlers, who instead of giving new names to the new birds of the New World applied names of European birds in an arbitrary, and often inappropriate, manner. Quail, Partridge, Pheasant, Robin, Redstart, Tree Sparrow, Meadowlark are some of these appellations, but Screech Owl is the most offensive.

These active little owls are excellent mousers and should therefore be protected and not destroyed, as they often are by misinformed or ill-willed persons, who take pleasure in magnifying the faults of their fellow-creatures in order to justify their desire to destroy. They may be attracted to a place by putting up suitable bird-houses, in which they can build their nest and hide in daytime and make themselves at home all the year round, being permanent residents in our region.

YELLOW-BILLED CUCKOO. *Coccyzus americanus.*

This is the common Rain Crow of our region. Its queer notes are often heard in sultry weather, but if the gardener were to rely on its prophecy of rain, his plants would suffer irreparable damage.

During the summer of 1908 its voice was one of the common sounds in the Garden; it was given in full with a long series of clucks and cows at the beginning of summer and in an abbreviated form in July, short cow-cows which may be mis-

taken for the notes of the Mourning Dove at a distance. But the Cuckoo of the Garden was not only a voice, it was also a common sight, as, contrary to its reputed aversion to long flights over open ground, its long-tailed, slender form was frequently seen gliding from one part of the Garden to another. Though its body is not longer than that of a Robin, its two and one-third inches longer tail brings its whole length nearer to that of a Dove, for which it might be mistaken at times. Its glossy white underparts in sharp contrast with the brown upper parts are good marks for recognition and the peculiar outline of the bird on wing, together with its straight swift flight, distinguish it at once from all other birds of similar size.

Since hairy caterpillars are its favorite food, there is no more useful bird in the Garden than the Rain Crow, though its promises of rain may not always be fulfilled.

BLACK-BILLED CUCKOO. *Coccyzus erythrophthalmus.*

While the Yellow-billed Cuckoo is by far the more common of the two species in this section of the United States, a pair of Black-billed Cuckoos also chose the Garden for a summer abode.

At first sight the two species resemble each other closely in shape, color and size, the small difference of half an inch in the length of this smaller species being hardly perceivable, but even in flight the Black-billed can be distinguished from the other by the absence of the cinnamon color of the wings, which in this species are glossy brown like the back. Seen from below the Black-billed has very little white at the tips of the brown tailfeathers, while the Yellow-billed shows conspicuous white patches on the end of the black tailfeathers. In good light the color of the bill tells the species easily apart, but it is only the lower mandible which is yellow in the one and black in the other, while the upper is black in both. The red color around the eye in the *erythrophthalmus* is visible only with a field glass. In fall the young of the year are not quite so easily distinguished, all characteristics being less apparent, especially the marks on the tailfeathers and the

color of the wings. In calls and general behavior, in food and nesting habits there is but little difference except in the eggs, which are smaller and darker blue in the Black-billed. Both species arrive from the winter quarters about the first of May and withdraw at the same time, about the first of October.

RED-HEADED WOODPECKER. *Melanerpes erythrocephalus.*

The Woodpecker family is sparsely represented in the Garden during the breeding season. The Downy and the Hairy visit the Garden in winter and the Yellow-bellied Woodpecker in spring and fall, but the beautiful Redhead and the hardly less showy Flicker are the only summer guests and even these are not as plentiful as one would wish. Both species seek the friendship of man and deserve it not only from an esthetic point of view, but also from that of utility. The Redhead may go for a little fruit in the orchard, especially cherries, but it deserves every one by its great help in keeping down injurious insects. Red, white and black, in large pattern, is the festive garb of the Redhead and a jolly good fellow it is, always ready for play and frolic. Sometimes it beats the drum a little too early in the morning on the roof of our suburban homes, but we readily forgive the disturber when we see how much confidence he places in us by chiseling his nest hole fearlessly where all can see it.

A few winter with us, but the great mass comes to us about April 20, when after a favorable night their long-forsaken old haunts are populated again and their loud gutteral croaks are heard everywhere. As mysterious as their arrival in spring is their departure in fall, when about the middle of September their haunts are deserted, though the day before Redheads were as numerous and noisy as ever.

NORTHERN FLICKER. *Colaptes auratus luteus.*

Few birds are better known than the Flicker. This is proved by the many common names by which it is known to different people. Some call it High-holder or Yellowhammer,

others Pigeon Woodpecker, and the books have it as Yellow-shafted, Yellow-winged and Golden-winged Woodpecker.

Fortunately the Garden harbors two pairs of Flickers and from their return to us in March till July their several calls, love and alarm notes, were among the sounds most commonly heard. Neither in feeding nor in their ludicrous courtship did the pretty birds in the least endeavor to evade observation, allowing near approach. Such a behavior is much at variance with that in places where shooting is going on, as for instance around Creve Coeur Lake, where Flickers have learned that constant vigilance is the price of liberty and life, and where you see the poor birds at ease only on the highest tree tops. Ordinarily Flickers feed mostly on the ground, their favorite food being ants, but beetles, weevils, grasshoppers and other insects constitute part of their diet, mixed with some vegetable food in the shape of wild fruit, grass and weed seeds. Since ants are a pest in a garden, protecting and spreading the destructive aphids or plant lice, the Flicker's activity is very welcome. The Flicker is too well known to need description, but it may not be amiss to say that it may easily be known even at a great dstance by its white rump.

CHIMNEY SWIFT. *Chaetura pelagica.*

Though not frequently seen to enter chimneys on the premises, Swifts are in the air above the Garden most of the time from their arrival in April till their departure in October. They are attracted to the place by the trees among which many insects find shelter in cool, rainy or windy weather. Being on the hunt all the time, they are good indicators of the whereabouts of winged insects; on warm, calm days, especially in sultry weather and before a storm they are circling at great heights; on windy days and after rains we see them fly low over the ground, and when the air is too dry and cool over the land, they join the Swallows over the water. Except during incubation we seldom see one Swift alone; they are very social birds and their great power of wing allows them to indulge their social tastes to a great extent and yet find enough

to eat. Unlike short-winged birds which require a certain domain to furnish the needed amount of food for themselves and young, and for that reason have to separate more or less according to the nature of their food and home, the long-winged birds can live all the year around in large companies and still find enough food, for they can in a short time travel great distances to procure it. Many whose nesting habits allow it, breed even in large colonies, but the Swift can not do it, because his former nesting in hollow trees and his present occupation of unused chimneys do not permit the presence of more than a few nests together, as for the sake of cleanliness they do not build their small saucer-shaped nests one directly below another. But as soon as the young can fly, many families use one chimney for a common roost, and when migration begins their numbers are swelled by transients forming aggregations of several hundreds, all entering one chimney for rest and sleep.

KINGBIRD. *Tyrannus tyrannus.*

Among country people the Kingbird is one of the best-known birds, because it likes farm land, where fields, meadows and pastures are beset with clusters of trees and where ponds or creeks are not far off. In the Garden, the new part with its meadow and lake attracted a pair of this eminent member of the Flycatcher family, and much of its animation was due to the strange twittering notes and the peculiar hovering flight of this pair. Nearly of the size of a Robin, but black above and white beneath, the Kingbird can easily be identified when perched upon some favorite prominence, and the white tips of its tailfeathers are a good mark for recognition when in flight.

Farmers who are wise protect these birds, not only because of the flycatching quality, but for the good reason that it is a protector of his fowl, assailing and driving off any hawk and crow which makes its appearance in the neighborhood. Foolish people call it Bee Martin and kill the poor bird, because they see it sometimes near their bee-hives, believing that it eats many bees, but careful investigation has shown that this

is a mistake. Out of 281 stomachs only fourteen contained bees, and of the fifty bees found therein forty were drones; only four working bees were positively identified, the rest being too much broken up to tell the sex. But fourteen robberflies, enemies of the bee, were also found in these stomachs, more than enough to make up for the few working bees.

CRESTED FLYCATCHER. *Myiarchus crinitus.*

While the Kingbird chooses the open land where trees are not plentiful, this member of the family prefers the forest and more or less open woods. In the Garden a pair is making its home in the arboretum, where for two months, May and June, its loud, harsh voice greets the visitor at all times of the day. About the size of a Robin, the originator of the queer notes is easily discovered, and even if the bird should leave its perch to elude a closer scrutinizing of its green coat and yellow waist below a pearl-gray throat, a glance at its rusty tail suffices for identification. During the mating period and when in search of a serviceable cavity for a nest, the interesting pair is easily watched, but after the nesting site has once been selected and nidification begun, it becomes more and more secretive and takes pains not to betray the whereabout of its offspring. Often mentioned in books, and deservedly so, is a peculiarity which this species shares with others of its genus in subtropical and tropical America, namely the use of snake skin in the make-up of its nest. Covering the eggs with it during temporary absence, the intention is undoubtedly to hide the eggs and scare intruders by the make-believe that the hole is the home of a snake.

WOOD PEWEE. *Contopus virens.*

The Pewee is originally a true woodland bird, but unlike other denizens of the forest which disappear entirely with the forest, it has long ago begun to accept the condition that civilization imposes and is now putting up with substitutes such as parks, cemeteries, and even large orchards.

Fortunately, one pair is content with an abode in the more densely wooded part of the Garden, the arboretum. For most

people the Pewee is only a voice, as it is a somber looking bird of the size of a sparrow, very dark greenish above and dull yellowish white beneath, and appears seldom in the open, doing its flycatching chiefly amidst the branches of trees; but its voice is something unique, a long-drawn pewee with the accent on the second syllable. This genuine woodland note is heard throughout summer, often when all nature seems to be asleep in the noon heat of the dog-days, and at dusk long after most other birds are at rest. Like all other members of the Flycatcher family the Pewee belongs to the most beneficial inhabitants of any place, because, living almost wholly on winged insects, it never touches any cultivated fruit. Unfortunately its beautiful moss-covered, saucer-shaped nest, saddled on a horizontal bough and well out of reach of enemies below, is too easily accessible to tree-inhabiting nest robbers, and this may be the reason why they are never plentiful in places where Squirrels and Blue Jays abound.

TRAILL'S FLYCATCHER. *Empidonax trailii.*

Every species of bird has a preference for a certain kind of surrounding wherein to make its home. Many choose the deep forest, some the edge of the forest or clearings, others select open country where trees stand far apart or in scattered clumps. Some want meadows with or without trees, some want them dry, others wet; some are found only in the immediate vicinity of water, others never very far from it.

Traill's Flycatcher is one of the birds that like low trees and shrubbery near water in partly open country, and is never found in the forest which it leaves entirely to a very near relative, the Acadian Flycatcher. In the Garden one pair has made its home in the arboretum along the creeklet, and two pairs in the new part, the North American Synopsis, which with its large pond and clear running water makes a perfect home for this and several other species. It requires quite a little watching to become acquainted with Traill's Flycatcher, for, though not very shy, it escapes notice easily on account of its unassuming dress and quick movements. The only time when we cannot help noticing it is when, perched on some

eminence, it utters its loud peculiar whittichee, a note unlike any other bird's song and therefore easily remembered when once known. As this note serves as its song, it is only given during the breeding season and ceases about the middle of July, after which time only a short whitt is heard and the bird seldom seen, removing with its young ones to the most retired places.

BLUE JAY. *Cyanocitta cristata.*

Rather strangely, Blue Jays are seldom seen in the Garden except during their migrations in spring and fall, and one pair only chooses it for a summer home. Blue Jays are quite an ornament to any park, but their presence during nesting time does not seem to be good for the smaller birds. The scarcity of these in our large cemeteries in the northern part of the city may be accounted for by the large number of Blue Jays and Squirrels in those places. Fortunately there are no Squirrels in Shaw's Garden, and it is hoped none will be allowed in it, but the number of Blue Jays and Bronzed Grackles should always be kept limited to a very few pairs during breeding time. There are very few people who have actually witnessed an attack of a Blue Jay upon eggs or nestlings of small birds, but the fury with which such birds are often seen to chase Blue Jays from the vicinity of their nests and the bitter complaints we hear after such visits permit the surmise that the perpetration of such crimes is not rare. At all other times save the breeding season, and particularly so in winter, the vivacious fellow in his fine livery is welcome everywhere, especially in the Garden, which is almost entirely deserted by birds from November till March. He has a variety of notes, which are used to best advantage when he detects a hawk or owl. On sunny days in cold winter owls like to come out of their holes to enjoy the warm rays of the sun, but there is not much enjoyment left after a Blue Jay has discovered his owlship. The news is spread in a minute and the Jays of the neighborhood respond promptly; soon the tree is full of Jays and the air full of their vociferations; the best thing the poor owl can do is to go back into its hole.

CROW. *Corvus brachyrhynchos.*

Adjoining the arboretum and forming a part of the Shaw estate is a large pasture. Crows like pastures, especially when they are next to a piece of timber with trees large enough to hold their nest. The arboretum has some stately trees of different kinds where a pair of Crows can hide a nest and raise a brood of youngsters without molestation. Although bulky, their nest is placed in such a happy way that it does not readily strike the eye of the passer-by. Crows are very clever in avoiding betrayal of their nest; at other times noisy and even boisterous, they are silent about their domestic affairs, so much so that during the period of incubation they seem to have left the neighborhood entirely. Even when feeding young, not much is heard or seen of them until the young have left the nest and are able to fly, when for several weeks the clamor of the ever-hungry youngsters announces the fact that the maligned bird has succeeded in raising a brood in spite of universal persecution. Farmers accuse the black visitors to their fields of pulling corn and stealing hens' eggs, but most of them admit that they have no proof of such misdeeds themselves, only hearing it from others and seeing the birds on their field in corn-planting time. That Crows sometimes rob birds' nests of their eggs has been attested by eye-witnesses, but whether this is a trait of the whole race or only of individuals has not been definitely settled. Because some blacks are thieves, it would be unjust to take it for granted that all are thieves.

COWBIRD. *Molothrus ater.*

April, May and June are the months when Cowbirds visit the Garden. The first few days after their arrival from the south solitary males are seen flying over or alighting on the highest tree tops, scanning the surrounding country and after uttering a few times their peculiar guttural song-notes disappearing as suddenly as they had come. A few days later small parties composed of two or three males and one or two females take the place of the solitary males. These little

companies keep together, roaming through the country, courting and contributing to the amusement of Nature lovers by their grotesque attitudes and queer gestures as well as by their strange utterances. In May and June, while still conspicuous roamers and frequenters of the same places as before, they are also met with singly or in twos, a male accompanying a female, moving stealthily through the lower branches of trees or through underbrush in search of a depository for their eggs. Later in summer young Cowbirds are sometimes seen being fed by other birds, but the old Cowbirds do not care what becomes of their eggs after they are trusted to the care of some warbler or other songster. Having finished their task of oviposition the old Cowbirds leave the grounds entirely and withdraw to farmland, over which they rove in flocks in search of food, being joined by the young ones when able to fly and to take care of themselves. These flocks retire southward in October, but small parties and single individuals remain with other Blackbirds into and sometimes through winter.

MEADOWLARK. *Sturnella magna.*

One of the most valuable constituents of the avifauna of the Garden is the handsome, cheerful Meadowlark, several of which persevered on the meadow of the Synopsis in spite of repeated grass cuttings and the attendant destruction of their nests. Though feeding entirely on the ground where they are easily overlooked, they have the praiseworthy habit of flying up to some eminence, sometimes to the highest tree top, to give vent to their somewhat harsh but not unmusical song. Besides this song of the male, both sexes have a loud chatter, apparently an expression of exuberant joy, frequently given, especially in the Garden, where they enjoy a protection which they do not find everywhere, as the poor bird is still regarded as a game bird in spite of Audubon societies and prohibiting laws. Doing no harm in any way and living almost entirely on insects, and being with us from February till November, the farmers and horticulturists ought to do all they can to preserve the bird as one of their best allies in the war against insect pests. In spring and fall the

pasture in the rear of the Garden is a favorite retreat for large troops of migrating Meadowlarks, and their cheery song and low chatter may be heard before the last snow of winter has disappeared as well as on cold gloomy days before their departure in November and after all other summer birds are gone. On farm land protected from the pot-hunter some Meadowlarks brave the rigors of our winters, but the great mass goes to the Gulf states, where they are found not only on cultivated land, but also in the open pine woods, keeping company with the Bobwhites, Bluebirds, and others usually associated with cultivated land only.

RED-WINGED BLACKBIRD. *Agelaius phoeniceus.*

The male Red-winged Blackbird with its bright red epaulets upon a deep black dress is an ornament to every surrounding, and we are fortunate in having a few pairs of them breeding in the Garden. They make their nests always near water, preferably on swampy ground, and are therefore often called Swamp Blackbirds. There is not much ground of a swampy nature in the Garden, but a pond in the arboretum answers the purpose, and it is there that the "concuree" of the just returned old Mr. Redwing greets us about the middle of March. During the first few weeks his voice may be heard only for a short time in the morning, as he comes only to tell us that he intends to be back on his old breeding ground for another season. His social nature calls him back to his comrades in the bottomland to feed and roost, and during wintry spells he may not show up for several days; but with the return of pleasant weather he will make up for lost time and sing his concuree with vim from morning till night. He may now be joined by a few other males, also promising to stay, but his mate does not join him until the swamp vegetation has made such progress that there is a safe prospect of enough cattail and similar plants wherein to hide her nest. Male Redwings are ardent lovers, and it is due to the prudence of the female that broods are not attempted before the season is so far advanced that she can hope for success in the rearing of her only brood of three or four youngsters. During the mating season,

which is at its height about the first of May, males and females are both very conspicuous and noisy, the latter with a loud peculiar note which is often uttered while on wing. After the nests are built and incubation has begun, the female becomes more and more retiring, but the male keeps up its concuree while watching over the environs of his nest. Trespassers are met with loud, screaming notes of alarm and, when incubation is advanced or young ones in the nest, he becomes bolder and circles above the head of the intruder in a menacing way. If no accident happens to the nest, in which case a second attempt will be made, the young of an old pair can be on the wing before the end of June, but the offspring of young pairs, which go to housekeeping several weeks later than the old folks, may not be able to leave the nest before the end of July. A family of Redwings was still present in the Garden in early August, but as soon as the young are able to fly well and have learned to find their own food, all say good-by to the Garden and do not frequent their breeding haunts again till the following spring.

ORCHARD ORIOLE. *Icterus spurius.*

For vivacity of song and sprightliness of manners the Orchard Oriole takes the palm and although only one pair graced the Garden with its presence in the summer of 1908, the eastern part of the Synopsis was resounding with the far-reaching peculiar song from early in May till the first of July, when demands of the clamoring young took up all the time of both parents, leaving none for song. Unfortunately the stay of Orchard Orioles on their breeding grounds is a very short one, as they desert them as soon as the young are fully grown and able to follow their parents, roaming through the country in search of their favorite wild cherries, wild grapes and similar delicacies which make up their chief diet before their departure in August. Orchard Orioles which we hear singing in July are usually males of the second year, *i. e.* not more than one year old, easily distinguished, because wearing an entirely different dress from the black and chestnut livery prescribed for the older gentlemen. A black patch reaching from bill

to breast is the only mark by which we can tell a young male from the uniformly green and yellow female, but these green youths breed in this plumage and raise a family the same as the black and chestnut older males, only a little later in the season. Although there is a certain characteristic timbre, by which we can easily tell an Orchard Oriole's song from that of any other bird, every individual songster has its own peculiar melody, by which we are able to distinguish individuals so well, that it is even possible to recognize them again in following years.

BALTIMORE ORIOLE. *Icterus galbula.*

One excited, love-sick Baltimore can fill acres of suburban ground with his shrill, impatient whistle, which is uttered with wonderful diligence and perseverance until he has found an affectionate partner, when his notes lose much of their wildness and become at times a mellow love song of real beauty. No one with eyes to see and ears to hear can long remain unacquainted with this strikingly beautiful bird in its unique attire of bright orange and deep black. The Baltimore is a great favorite with country people and knows it and repays kindness and good will by building its nest, a pendulous pouch of six or more inches in length, from the extremity of a swaying branch as near as possible to the farm house, often in the very tree which shades the yard. So well constructed are these nests and so firmly attached that they are usually hanging throughout winter, but never used a second time. In the weaving of the nest, which is the work of the female alone, vegetable fibres of great strength are used, taking them from different plants according to locality, also accepting such material as thread, twine and braid and interweaving them with the natural filaments. In the Gulf states southern moss (*Tillandsia*) is sometimes used exclusively. At Old Orchard several generations made their nests entirely of horse hair, very beautiful fabrics and of great strength, remaining in the trees for years until the holding twigs were broken off by storms. With increasing family cares Baltimore songs give way to mere chatters and calls and are soon

replaced by the clamor of the hungry brood, begging continually for food. With their silence we find that the whole family has departed and the species almost entirely disappeared until migration begins in August, when at rare intervals their beloved voice greets our ear again and shy birds are seen flitting from treetop to treetop.

BRONZED GRACKLE. *Quiscalus quiscula aeneus.*

A few Bronzed Grackles walking on the lawn, busily engaged in feeding, are certainly objects of real beauty and elegance. It needs no direct sunshine, even diffused light reveals a splendor of color not easily surpassed. The head and neck are a rich, deep prussian blue with a violaceous gloss, which changes in places to a green metallic iridescence. This exquisite coloration is abruptly defined against the intense golden bronze of the back; wings and tail are purplish black. Its slender form is admirably proportioned and well balanced by the long, broad tail; its walk is graceful and its carriage elegant to a degree. The expression of its yellow watchful eye bespeaks the owner of more than ordinary intelligence, and whoever has kept one as a pet will bear witness that this is true. With kind treatment it becomes remarkably tame, and being docile can be trained to enjoy the freedom of house and garden, and be a source of much amusement to the family. In the wild state, too, it easily comprehends whether it is liked or not, and becomes truly confiding where not molested, while it is one of the shyest, most wary birds where persecuted. A small colony of them finds an asylum in the arboretum and contributes largely to the life of that part of the Garden from the latter part of March till July. The time of courting and mating is the period of their greatest conspicuousness. Filling the air with their squeaky voices and chasing each other, often two or three males after one female, they act as if they were the sole owners of the place until all are paired and nidification becomes their all absorbing occupation. It is at this time that people are apt to call them boat-tailed, for, when on wing, the excited male carries its long tail folded upward from the middle, causing the semblance of a keeled boat.

AMERICAN GOLDFINCH. *Astragalinus tristis.*

In late summer and early autumn, when some of the summer sojourners have left their breeding grounds and the remaining ones are all more or less elusive, the Goldfinch plays a prominent part in the bird life of the Garden. Goldfinches are notoriously late breeders, and it is only about the middle of August that their three or four young ones are ready to accompany their parents to the inviting beds of seed-bearing composites, so plentiful in the Garden. Two families, reared on the premises, had their headquarters in the arboretum and Synopsis throughout September and October and felt so much at home that they paid little attention to visitors, keeping unconcernedly at their task of removing akenes from receptacles within a few feet of the observer. They even invited attention by uttering their pleasing canary-like notes whenever they alighted or changed their perch. Being very fond of running water for drinking and bathing they were often met with at the little brook in the Synopsis. When after the first frost in October the flower beds, which had supplied their favorite food, were cleared, they joined the flocks of ground feeding Juncos and other members of the sparrow family and disappeared with them at the end of the month. Long before their departure the males had changed their handsome black-trimmed yellow livery for a plain brownish traveling suit, not much different from that of the female and young. Roving troops of Goldfinches may visit the Garden temporarily during the winter and flocks of north-bound wanderers will stop over in April and early in May, but it will be June before pairs leave their comrades and begin to look around for a nesting site.

HOUSE SPARROW. *Passer domesticus.*

The House Sparrow is a wonderful bird. Less than two thousand individuals introduced from Europe between 1851 and 1881 have increased to many millions, which have overspread the whole United States from one end to the other. Wherever there are occupied human habitations there is the

House Sparrow, not only along railroads, highways and rivers, but in the remotest settlements. At St. Louis the first were introduced in 1869, a few pairs only, but it seems they have multiplied from the start, as Sparrows were seen in widely separated parts of the city as early as the autumn of 1871 and they had taken possession of the entire city in 1875. Since then, in spite of all persecution and serious adversities, their increase has not been checked and the Garden retains its quota, giving it life and animation in the dreary winter months, when all other birds have deserted it with exception of a few of the hardiest kinds. As no nesting boxes are provided on the premises, they have to build their nests in places where they would not get permission from the director, if they asked for it, as these are built much more for warmth and comfort than for ornament. There are no better parents among birds than the House Sparrows. Although they like society, they still find time to raise two or three broods of four or five young each season. No trouble is too much for them; if their nest is removed this evening, by noon tomorrow it will all be carried back again and this may be done for several days in succession. A Sparrow never deserts its young; should one of the parents be killed, the other will do the work alone; should one of the young fall from the nest before it can fly, it will not be lost, the parents will feed it and see that it gets into a safe place. If one is put in a cage, the mother will feed it for days and weeks, even if she has to enter a room to get to it.

The House Sparrow has several remarkably good qualities, to which it owes its marvelous multiplication and unparalleled spread. Some of its foremost traits, as for instance its reputed egotism and lack of consideration for others, are so human-like and undoubtedly the result of its ages of contact with man, that they have earned for the poor bird the deadly hatred of just those persons who possess these traits themselves in a high degree.

EUROPEAN TREE SPARROW. *Passer montanus.*

This lovely little bird should be known to every St. Louisan not only because St. Louis and vicinity is the only place in

America where it occurs, but principally in order to avoid mistaking it for its cousin, the House Sparrow, to which it has a general resemblance. It has the same reddish brown black-streaked back, but differs from it in having the top of the head a light chocolate instead of the deep gray of the male, or light brown of the female House Sparrow. While the black patch of the adult male House Sparrow covers chin, throat and breast, the Tree Sparrow has a much smaller black spot covering the chin only. But the best mark by which to know the Tree Sparrow is a black round spot on the side of the head, surrounded by the white cheek and therefore easily noticed. The Tree Sparrow is a little smaller and the sexes are alike in coloration, even the young in the nest having the black spots on ears and chin already indicated, while the female and young of the House Sparrow have no black markings about the head and neck at all.

The history of this exclusively St. Louisan species is interesting. During the first ten years after the Civil War it was quite a fad among nature lovers in the United States to attempt the acclimatization of European singing birds; well-meaning persons in all parts of the country imported or bought them from bird dealers and set them free, but, unfortunately, with very poor results as far as St. Louis is concerned. Among a lot of different kinds of birds, such as Chaffinches, Bullfinches, Greenfinches, Goldfinches and Siskins, bought by Messrs. Carl Daenzer and Kleinschmidt, there were twenty European Tree Sparrows. All these birds were liberated in Lafayette Park on April 25, 1870. After a few days all had left the park and nothing was seen of any of them, though sometimes unauthenticated reports came in that this or that bird had been seen at such and such a place. The Tree Sparrows were the only ones found to have taken root in the city, for in the summer of the following year it was discovered that they were quite at home in the vicinity of breweries in the southern part of the city. From that time on their future seemed to be secure; they had no trouble in finding food and nesting sites, were well liked, and spread farther from year to year. But in the meantime their larger cousins, the House Sparrows, which had made their original start from the center of town

and had become more and more abundant, began to invade the domain of the Tree Sparrows, driving them out of their nesting and roosting places, thereby forcing them farther and farther toward the outskirts of the city. In 1878 the invasion of the House Sparrows and expulsion of the Tree Sparrow reached the old city limits at Keokuk street, where the writer lived at that time; but it did not stop there, but kept on until at present there are very few places in the city where the Tree Sparrow survives. Even in the suburbs it has a hard stand against its stronger cousin, but finds sometimes holes which the bigger House Sparrow cannot enter or which do not seem safe enough for him, because too low down. It is therefore easy to understand, how the weaker of the two species became a tree sparrow, being everywhere forced to the trees outside of towns, though both are equally anxious to profit by the advantages which an all year residence near human habitations affords. In countries where the House Sparrow does not occur, as in China, the so-called Tree Sparrow is the regular House Sparrow and in undisputed possession of all towns, large and small. While an increase in the number of the already too abundant English House Sparrow is not desirable, our St. Louis Tree Sparrow needs and deserves all protection we can give, and St. Louisans should severely discriminate between the two species, encouraging the one, discouraging the other. If no discrimination is made and war is waged against Sparrows, it is very likely that the innocent Tree Sparrow is the greater sufferer of the two, because of its strangely confiding ways, trusting to the good will of man instead of fleeing with its much more cunning cousin at the first signs of danger. While it shares the best qualities of its cousin, it is not aggressive and pugnacious against other birds, nor quarrelsome among its own kind, but always gentle and very much attached to each other; its tones, too, are more pleasing and become even musical when concerting in chorus, one of their favorite pastimes. Fortunately, Shaw's Garden has always been, and still is, one of the few places in St. Louis where the Tree Sparrow has found refuge and succeeds in raising a few broods. It would be desirable to see boxes put up for their exclusive use, which could be done by placing

them too low down for the House Sparrow, but inaccessible to cats, boys, coons and other inveterate nest robbers.

CHIPPING SPARROW. *Spizella socialis.*

Before the introduction of the English House Sparrow a Chippy was always a Chippy or Chipping Sparrow, that slender graceful member of the Sparrow family, which made its nest in the nearest vine, shrub or tree in the garden and came fearlessly to the house to pick up the crumbs. Nowadays when we hear city people speak of a Chippy, we do not know whether the real Chippy is meant or the English House Sparrow, most probably the latter. Another name for it is Hairbird, because its pretty little nest is always lined with horse hair, which gives it a neat, clean appearance; but call it by any name it is always the same gentle creature that is well known to most country people for its familiarity and self-complacency in the rendition of its unpretending song. This is of no great value judged from a musical standpoint, but it fills its place well and makes up in quantity for any shortcoming in quality. As the Chippy makes two broods in a season, its song period is not confined to a few weeks in spring as is the case with many other songsters, but performances are renewed in the heat of summer, when its high-pitched ditty is often the only thing heard. As it lives on insects and weed seeds and feeds its young entirely on insects, doing only good and no harm, its extended stay in the Garden from March to October is to be encouraged, and confusion with the less welcome English House Sparrow should be carefully avoided. Only two pairs were found breeding in the summer of 1908, while there would be room for ten times as many in the different parts of the grounds. Wintering in our southern states and eager to return to its breeding grounds as early as possible, it has sometimes to suffer by late wintry spells, and the present general reduction in the number of Chippies can be traced to the abnormally cold spring of 1907.

SONG SPARROW. *Melospiza cinerea melodia.*

For St. Louisans to listen in the summer to the song of a Song Sparrow is a rare treat. Up to the last few years no

Song Sparrow remained to breed in St. Louis, but in 1907 and 1908 one pair made its summer home in Shaw's Garden, and the fine song of the male greeted the visitor almost as soon as he entered. Most birds are in the habit of mounting a prominent perch for the delivery of their song, and our new friend often chose the head of the statue of Juno in the sunken garden, from where he could be heard all over the most frequented part of the Garden. The dense hedges in grandma's garden afforded a safe retreat and hiding place at all times, probably also for its nest.

Large numbers of Song Sparrows come to us from the north in October, stay a few weeks and pass on southward; a small number remains with us all winter, chiefly in river and creek bottoms, where rank vegetation offers shelter and food. In early spring the great mass passes again through Missouri on their way to their breeding grounds in the northern states and Canada, but as breeders Song Sparrows were formerly considered rare even in southern Iowa. It is only in the last decade that it has become evident that the species is slowly extending its breeding range southward. When ten years ago the writer found a pair nesting at Maple Lake, St. Charles Co., Mo., he considered that the most southern locality. Since then he has met with the species twice in the northern part of St. Louis, and lately even as far south as St. Genevieve. Its occurrence in summer in the Garden is therefore of more than ordinary interest and its reappearance in future seasons to be anticipated with pleasure.

TOWHEE. *Pipilo erythrophthalmus.*

Nearly of the size of a robin, this stately aristocrat among the ground sparrows catches the eye of even the most uninterested visitors of the Garden by the showy juxtaposition of its colors, the deep black of head, neck and back, the clear chestnut of the sides and the pure white of breast and belly. Its abrupt and startling note "towhee," with which the male generally introduces himself, is not less striking than his appearance; it is heard at all times during his stay with us from early in March till the end of October, and betrays his pres-

ence scores of times when not a glimpse of him can be had in the dense undergrowth. A softer "t'whee" in answer to his stentorian warnings indicates that his lady is not far away and is aware of the impending danger. His real song, a bell-like note of great strength, is heard only in the breeding season, when, perched on some eminence, usually less than twenty feet above ground, but sometimes on the uppermost branch of a high tree, he is extremely liberal with it for hours at a time. The female, which has the black replaced by brown, is one of the most secretive birds and therefore comparatively seldom seen; but both, male and female, are easily identified, even when trying to avoid a close acquaintance, by the broadly white-edged and white-tipped black tail, spread wide open in their singularly jerky flight. When busily engaged in feeding, which is almost always done on the ground, the loud rustling of dry leaves often announces their presence, and by careful watching we see them jumping up and tossing with both feet the dry leaves backward in order to get at the different forms of insects in hiding underneath. Only one pair located in the Garden this year, but with the increase of shrubbery will come an increase in the number of this desirable songster.

CARDINAL. *Cardinalis cardinalis.*

Of the whole bird population of the Garden there are only four species which might be called permanent residents, *i. e.* of which the same individuals inhabit the grounds all the year round, namely the Bob-white, Flicker, Mocking-bird and the Redbird or Cardinal. Birds of such bright plumage as the Redbird are usually associated with tropical and subtropical climates, and it is therefore a great surprise to many people to see the vermilioned bird contrasting with the snows of our wintry landscape. It is his robust constitution and his faculty to put up with any kind of food, vegetable and animal, which allow him to endure our low temperatures. His powerful bill can crush the hardest seeds and his skill in scratching the floor of his home supplies him with insect food at a time of the year when we might suppose none could be had. He certainly does not seem to suffer from hunger even in midwinter,

for on calm, bright days he cheers his mate with his sweet song, which has such a human quality that we are tempted to answer, but we rather leave it to herself, who, a rare thing among birds, has the gift of song and echoes his whistle in a subdued tone, befitting her subdued colors and modest ways. That well-matched pairs of birds remain paired and together all the year is demonstrated by our Redbirds and other easily observed permanent residents, especially in places like the Garden with only one pair of a kind wintering. Looking searchingly through the bare branches of a thicket we may at first only see him with the bright color, but it will not be long before she of the neutral tints also appears and both seek safety in flight together.

ROSE-BREASTED GROSBEAK. *Zamelodia ludoviciana.*

Beauty of plumage and sweetness of voice are most happily combined in this bird. Deep black and pure white, set off with brilliant rose-carmine on breast and lining of wings, are the pleasing combination of colors, and its song can only be compared with those of the best songsters of all countries. It has a distant resemblance to that of the Robin, but is a continuous, rich, and finely modulated whistle, full of life and gladness, in my opinion the most charming bird song we have. For breeding the Rosebreast likes a locality where different kinds of shade trees, orchards and gardens abound, and is therefore a common denizen of our suburbs; but the best place to make its acquaintance in St. Louis is Shaw's Garden. Soon after the twentieth of April we may expect his return from the tropics, where he spends his winters. His arrival cannot be kept unnoticed long, for, in spring, he does not look for concealment; on the contrary, he shows himself with rare fearlessness and whistles his notes where people can see him. It is his desire to mate which brings him back to us and, coming in advance of his mate, he wants her to find and join him immediately. It is his impetuosity in wooing that makes him such a conspicuous object amidst the multitude of attractions to eye and ear in the luxuriant month of May. The modestly-clad female looks so different from her

showy mate, that one would hardly believe that they belong together. All his fine colors are replaced by brownish streaked with darker, and no trace of the rose color is to be seen anywhere, even the lining of the wing being saffron-yellow.

INDIGO BUNTING. *Cyanospiza cyanea.*

This bird, or rather the male Indigo Bird, is often confounded with the Bluebird, but it is blue all over, while our Bluebird has the underparts cinnamon and white. The female Indigo Bird is entirely brown. Young males in their first spring, *i. e.* not yet fully one year old, are of a queer mixture of blue and brown at the time of their arrival in early May, but, being mature, they breed, and change to the full adult plumage during the summer. The male Indigo Bird is quite a songster, but not a great artist, being too hurried in the delivery to give much expression to his song, which consists only of a few bars. Often even this is too much for him and he breaks off abruptly after the first bar. While it fills well a place in Nature and is rendered with great liberality at times when all other feathered musicians are silent, namely in the noonday heat of midsummer, the monotonous repetition becomes rather tiresome. But, as with all bird songs, there is an astonishing individual diversity, and it requires sometimes close attention even for the trained ear to recognize the originator of the queer strains as our well-known Indigo Bunting. In the choice of location the species is not particular; almost any kind of surrounding will do, as long as it has some shrubbery to conceal its nest, and even this is not absolutely necessary as nests are sometimes placed in trees twenty feet from the ground. In the bird community of the Garden the Indigo Bird is represented by only one pair, but with the extension and growth of shrubbery an increase in their number will undoubtedly follow, as all other conditions for a desirable abode are given. The species is one of the most common and best distributed summer residents in Missouri, and in extent of its breeding range is equalled by few other birds, as it reaches from the Gulf to Canada and from the Plains to the Atlantic. This abundance can perhaps be explained by the protective

color of the female and young and by the fact that two broods are raised, for we see unfledged young in August and sometimes even in September.

WARBLING VIREO. *Vireo gilvus.*

This bird is correctly named; it is a warbler in the true sense of the word, because it really warbles. The birds which we usually call Warblers, namely the beautifully colored members of the family Mniotiltidae or Wood Warblers, have very little musical ability, and not one of them has a song which could be called a warble, *i.e.* a soft, sweet flow of melodious sounds. The name was borrowed by the first ornithologists of this country from the Old World family Sylviidae, of which many members have a clear, sweet, flexible voice. The family Vireonidae, to which our Warbling Vireo belongs, is distantly related to the Shrikes. Vireos are also called Greenlets on account of their plain greenish coloration; all are diligent, voluble songsters, some real artists, and all weave pensile nests, suspended by the upper edge between forks of horizontal twigs. Long after the clever builders have departed for their winter home, their nests are seen hanging in the trees, sometimes in the very tops. While safe from enemies below, these nests are too much exposed to attacks from winged nest robbers, such as Grackles and Blue Jays, and the sudden disappearance of the songster from the Garden in the middle of the season may possibly be explained by a little tragedy in the tree-top. Where not molested, the Warbling Vireo is one of the most constant singers, remaining musical from its arrival in April till its departure in September with only a short pause in August. A well-grounded fear of feathered nest robbers is in all probability the reason why they like to build their nests near human habitations and have become common residents of villages, towns and the shade trees of frequented streets in large cities.

BELL'S VIREO. *Vireo bellii.*

Not less than three pairs of Bell's Vireo have found an abode in the Garden and have reared broods. Their home is not in

the lofty tree tops with the Warbling Vireo, but in the dense shrubbery of the Synopsis, and their little basket-shaped hang-nests are well hidden, several feet from the ground and protected from above by foliage.

Bell's Vireo looks like a small edition of the Warbling Vireo; in coloration the resemblance is confusing, but besides the smaller size and totally different song it is its habitat which distinguishes it at once. It seldom leaves the deepest recesses of a thicket and even while singing tries to keep out of sight. Its song can not be compared with that of the Warbling Vireo and is inferior to all Vireo songs of our region, but as with other poor singers, it makes up by diligence what it lacks in melody. The song is so short and rapidly emitted that its delivery, although composed of twelve distinct notes, consumes only one second, but by actual timing seventeen deliverances in a minute is no unusual performance and may be kept up for many minutes at a time to be repeated throughout the day. Bell's Vireo has its center of distribution, or what may be called its original home from whence it spread into the Mississippi Valley, on the western plains, and is therefore not put out like most other songsters by our scorching July and August weather, seeming rather to enjoy it, if we can judge by the prolongation of its song period through these months.

YELLOW WARBLER. *Dendroica aestiva.*

This is the wild canary of the boys, or rather one of the two, since the Goldfinch is also called by that name in spite of its black cap and black wings and tail. The Yellow Warbler, also known as Summer Yellowbird, has nothing in common with the Canary except that it is entirely yellow and is of about the same size. While the Canary belongs to the nearly cosmopolitan Sparrow family, the Yellow Warbler is a member of the strictly American insectivorous family of Wood Warblers. Neither in its ways, nor in its voice, has it anything in common with the Canary. Its song is a sprightly, but simple, lay, repeated for hours and days without any modification, but full of indescribable happiness, which fits splen-

didly the blossoming apple trees and young green of the willows, where we hear it first after its return from a winter home in the tropics. Originally an inhabitant of the bramble and hazel thickets along the border of woods and the varied plant growth along water courses, it has with the spread of cultivation adapted itself to the new conditions and is quite at home in our orchards, parks and gardens, where it frequents trees as well as shrubbery. It even seems to seek the friendship of man, but undoubtedly from selfish motives, because a close proximity to man's habitation secures for its nest freedom from undesirable visits from the Cowbird, which has a special fondness for the Yellow Warbler in the choice of foster-parents for its offspring. It has not been ascertained whether this freedom from imposition was enjoyed by the Yellow Warblers of the Garden, but their song which was kept up till the middle of July showed no deviation from their usual cheerfulness.

YELLOW-THROAT. *Geothlypis trichas.*

Yellow-throats like shrubbery in the vicinity of water, and it is for this reason that several pairs find a congenial summer home in the Garden, being particularly fond of the new part, called the Synopsis. Although seldom seen, the presence of the male is not long kept secret, for soon after his arrival in April his loud and peculiar song announces the fact in unmistakable manner. Like all songs of our so-called Warblers it is no warble at all, but a simple, energetic ditty without any modulation and remains in the same individual unchanged throughout the song-period which lasts to the latter part of July, when molt begins. Since molting seems to have a debilitating effect on the general health of birds, they are in no mood to sing, do not even care to utter their call-notes and seek rest in seclusion. After completion of the molt and before their departure in September, the song of the Yellow-throat is again heard for a few weeks, but has nothing of the force of the breeding time, when in the ecstasy of love and happiness excited song-flights are sometimes indulged in. The female, one of the most timid birds, is plain brownish green above and yellowish beneath, but the male

is a little beauty, golden yellow below, bright green above, ornamented by a black mask which is bordered above by gray. Thanks to the modest dress and unobtrusive ways of the female and the caution and foresight with which the Yellow-throats care for their nest, which is so well hidden that even the Cowbirds can not find it easily, the species, with slightly differentiated geographic races, is one of the most abundant Warblers with a breeding range from the Atlantic to the Pacific and from Florida to Labrador and British Columbia.

YELLOW-BREASTED CHAT. *Icteria virens.*

When in May or June you take a stroll through the Synopsis and are suddenly startled by a low whistle in your near neighborhood, as if somebody whistles to his dog, it is very likely a bird of the size of a Tanager, wearing a green coat over a yellow waist, black lores and white eyelids, the Chat, our largest Warbler. If you stop to watch him, you may be quite amused by his queer antics and quaint song. Mounted on top of a tree he will leap into the air and with measured wing beats, raising his wings so high as to touch above, fly with dangling legs and jerky, prancing motion to another tree. When you remain near him, you will be surprised by the variety of notes he has in his repertoire, mostly odd notes in different keys, guttural chucks, humanly whistles and explosive sounds, all of which lead you to think he may be mocking other birds, but they are all his invention. For two months he is one of our noisiest birds, but becomes less and less musical in July, stopping entirely before the end of the month never to be heard again before his departure. When not singing, the Chat is a mysterious bird, for in spite of its large size and bright colors, males and females being alike, it is seldom seen. In addition to its choosing the most impenetrable thickets it has a knack of hiding in their deepest recesses, but is less careful in the location of its nest and often the victim of the Cowbird. Nevertheless the Chat with only one geographic variation, the Long-tailed Chat of the west, has a breeding range extending from the Atlantic to the Pacific and from the Gulf

states to southern Canada, and is a common breeder in Missouri.

MOCKINGBIRD. *Mimus polyglottus.*

St. Louis has been fortunate the last few years in harboring quite a few Mockingbirds within her precincts. In University City there were so many of these songsters in the summer of 1907 that people complained of being kept from sleeping at nights and asked through the newspapers for advice how to get rid of them. Calvary Cemetery, Washington University, Forest Park and Shaw's Garden are among the localities favored by them. More are in the suburbs and in the region of the truck gardeners. Mockingbirds like gardens and build their nests as near as possible to dwellings in a bush or vine, although the whiskered pet of the household is often their undoing, less so of the old ones than of their young just out of nest. The greatest nest robber is man himself and, if not well guarded on private grounds, the young are almost always stolen from the nest by persons who want to raise and sell them. Some catch even the old ones and put them into cages, only to see them pine away and die. As the Mockingbird is partly a permanent resident, pairs are found on their breeding grounds in winter, and in Shaw's Garden the species is one of the few which may be met with in that season. Their song is not heard before March and does not become general before the latter part of April, when those which have left us in fall are returning, May and June is the time when the songsters are in their glory, apparently in great excitement, hopping about, bounding with widely spread tail and wings into the air, or flying from one favorite perch to another, singing all the while. This is the period when singing at night or in the dawn of morning they are said to become a nuisance to persons who prefer sleep to music.

CATBIRD. *Galeoscoptes carolinensis.*

From the twentieth of April to the first of October we are always sure to meet with at least one Catbird in the Garden, but we are more likely to find several of them in the different

parts of the place. During the nesting season we find them near shrubbery and along hedges hopping about on the lawns or between the flowers, diligently looking for entomological specimens, which during summer make up the principal part of their diet. In autumn wild fruit is preferred, and all kinds of berries from Magnolia and Sassafras to Catbrier and Poison Ivy are in demand. While the Catbird may do some harm in places where there is no wild fruit to be had, in the Garden it finds such an abundance and variety of fruit-bearing trees, shrubs and vines, that it does absolutely no harm, but a great amount of good as an indefatigable insect destroyer, though we have not ascertained how many percent of useful insects are among them, taking it for granted, as friends of the bird, that ninety-nine percent are injurious. Formerly it was sufficient to know that a bird lives on insects in order to class it among the benefactors of husbandry, but nowadays the agriculturists want to know what kind of insects it eats, and woe to the poor fellow which is found guilty of partaking too much of predaceous and parasitic insects, spiders and myriapods. The Catbird's song is none of the best, neither in composition nor in execution, but it pleases its author, undoubtedly also his mate, and certainly a great many people who are not too particular but glad to welcome and enjoy all expressions of joy and good cheer, whether highly musical or not. Its cat-like mewing call-note is such a familiar salutation in our rambles that we miss it much when it ceases in the fall.

BROWN THRASHER. *Toxostoma rufum.*

The Mockingbird, Catbird, and Thrasher form a trio of vocal artists of prominence among our Garden musicians and while the first two are more or less imitators of other bird's notes, the Thrasher's song is mostly original composition and such a good one that both cousins borrow largely from it. It is only to be regretted that its song-period is so short. A great songster from its arrival in early April till the last of May, it is only occasionally heard in June and quite silent in July. After the molt we catch sometimes snatches of fine song at half voice coming from deep recesses, but their diet of

astringent wild fruit does not seem to stimulate them much to poetry and song. Many people call it the Brown Thrush, but it is neither brown nor a thrush, for it belongs with its cousins to the Wren family. Its color is a rich rust-red above and white, tinged with light cinnamon and heavily streaked with brown, below. It differs from the Wood Thrush, with which it is often confounded, by its curved bill and its greater length, nearly one-half of which belongs to the tail. It is terrestrial and rasorial in its habits, often seen half running, half hopping, on the ground in different parts of the Garden. Its usual haunts are open woodland, hedgerows and thickets, and though it makes its home in parks and garden, it does not become so confiding as its cousins, shunning observation as much as possible. Only when singing does it occupy a prominent perch; ascending tree tops and assuming an upright position it floods the air with a flow of melody which is equalled in charm and force by few birds. When startled it utters a peculiar alarm note, that sounds like a smack with the tongue, often followed by a soft, melodious whistle.

HOUSE WREN. *Troglodytes aëdon.*

Nooks about the many buildings of the Garden afford several pairs of House Wrens desirable nesting sites, and throughout the summer the little busy-bodies cut a prominent figure in the different divisions of the establishment. Originally the Wren's home was along borders of woods and in the timber fringing water courses, where natural cavities in trees and old woodpecker holes were used for nesting sites. With the advent of settlements the Wren became a companion of man and is now rarely found far away from dwellings during nesting time. Its pert appearance, fearless demeanor, and attractive manners have won the hearts of many people who affectionately call it their Jenny-Wren and treat it with much consideration. In the suburbs of St. Louis it is one of the most familiar birds. Its song is only a short trill, but is delivered with much vivacity and earnestness, while the performer sits upright with drooping tail and thrown-up head, quite different from its usual attitude when it creeps and

dashes about with upraised tail, bowing and bobbing. On the ground it often moves about like a mouse among the flower-pots and plants, and in its constant search for insect food it renders special service by visiting boldly dark and dangerous places where no other bird would dare to go. Like all Wrens it is very inquisitive and greets suspicious objects with loud scolding; well-known foes, like the Cat, are vehemently chided until they quit the vicinity of the nest or young. Since six or seven young are reared in each brood and sometimes even two broods are made, the number of insects destroyed by one pair is simply incalculable and, though spiders form a part, the House Wren must be counted among the most beneficial birds.

WOOD THRUSH. *Hylocichla mustelina.*

From the twentieth of April to the twentieth of July, fully three months, the song of the Wood Thrush can be heard in the Garden every day. For a series of years one pair made its nest in the arboretum in the same tree, a Norway Maple, near the gate. Though the nest may be only twelve feet from the ground, the brooding bird keeps sitting, no matter who passes underneath, or sits down on the bench below. The male is usually not far away singing to her to keep her company. A Wood Thrush sitting on her nest is a lovely picture; her big, calm, intelligent eye appeals mightily to our sympathy as she watches everything that goes on around her, ready to leave, but determined not to forsake her charge until self-preservation shall make it absolutely necessary. Formerly the Wood Thrush was considered a shy denizen of the deep forest, a sort of recluse, but this has changed in the course of time, and it has become a bird which is actually courting the friendship of man and winning it easily by its many good qualities, graceful ways, excellent song and confidence in the best sides of man's nature. In the suburbs of St. Louis it is one of the most familiar birds, who knows the advantages of living on private ground, building its nest within a few yards of the windows of occupied houses. Its glorious song is singularly solemn and serene; the tones, loud and clear, are rising

and falling in rythmic flow, softly dying away only to swell again to a powerful ring. It is chiefly a ground feeder and sings from the lower branches of a tree, where it also builds its nest, which may be recognized by being saddled with loose material hanging down its sides. Sometimes experiments with novel building material, such as muslin, paper and poultry feathers, are made, but, if used in large quantities, much to the detriment of the structure, which can not stand hard rains as does the old style nest.

AMERICAN ROBIN. *Merula migratoria.*

During eight months of the year, from the beginning of March to the end of October, the well-known Robin greets the visitors to Shaw's Garden either with its peculiar call-note or with its loud song. Several weeks before spring really sets in, this cheering music of less than half a dozen bars, often the only bird notes within hearing, rouses the yet drowsy Nature and announces the approach of another season of warmth, beauty and delight. Throughout March and to the middle of April whole flocks of migrating Robins are sometimes found scattered over the several parts of the Garden and pasture, hopping and running about or resting on trees, calling lustily to each other, and once in a while offering a song. Our own Robins are by this time mated and are building, or, if the weather has not been bad, are already sitting on eggs, while these north-bound guests are still hundreds of miles away from their summer home in the Canadian wilds. At the end of July, when the young are grown, many of the breeding places of the Robin are deserted, but not so Shaw's Garden, which has attraction enough in its plentiful and varied supply of wild fruit to retain its Robins through autumn, but we have to look for them in the Wild Cherry, Magnolia and Sassafras trees, in the Wild Grapes, Virginia Creeper and Greenbriers, in the Dogwood, Elder and Poke bushes, and at last under the Hackberry and Persimmon trees. During September whole troops are sometimes present, and their song which has hardly ever been heard since the middle of July is in the air again, fine old birds in the darkest colors, almost black on

back and deep rufous on the breast, mixed with younger birds of paler gray and palest rufous, and even some in the spotted plumage of the lately fledged with vestiges of babyhood in voice and action.

Visitors.

SPARROW HAWK. *Falco sparverius.*

Although not a breeder in the Garden, the Sparrow Hawk is a fairly common visitor, coming over from the Female Hospital, where it has made its home for many years. Since the English House Sparrows have become so abundant, Sparrow Hawks are permanent residents along the city limits, and visit all the western parts of town on their foraging expeditions. Forest Park, Washington University and University City are some of their headquarters, and single individuals or pairs may be seen there all the year round. Their visits to Shaw's Garden are undoubtedly made in the interest of their larder and do not mean any fondness for the beautiful flowers. Mice and grasshoppers are the main attractions, together with the freedom from persecution, which they do not enjoy everywhere, since no boy in possession of a small rifle can withstand the temptation to use the lovely creature for a target, when it alights on a telephone post in his neighborhood.

BELTED KINGFISHER. *Ceryle alcyon.*

The lake in the new part of the Garden, called the Synopsis of North American flora, is a great attraction for different kinds of birds at all seasons. In fall the Red-shouldered Hawk likes to loaf along its banks, where he has ample opportunity for Nature study, as it is well known that he takes interest in eleven classes of animals, mammals, birds, snakes, frogs, fish, insects, centipedes, spiders, crawfish, earthworms and snails. In migration time short calls are paid to the lake by the Wood Tattler, the Green, Blue and Night Herons, the Coot, Dabchick and several species of Ducks, among them a pair of the rare Red-legged Black Mallard, Dec. 9, 1908. In

spring we find, stopping for a little hunt, five different kinds of swallows and other insectivorous birds, attracted by the abundance of food, which a sheet of water offers when the dry land is barren. Another kind of attraction causes the more or less regular visits of a pair of Kingfishers, which have probably miles to fly from their nest to reach these quiet hunting grounds for a few nice, healthy minnows taken out of that fresh cool water. A Kingfisher in its white and blue livery with the high crest and long bill is an ornament to any landscape and makes a picture worthy of the photographer's art who may catch him as he sits watching on some overhanging branch, or hovering over the water, or swooping down upon his prey, or emerging and making off with his finny game. Equally characteristic as his queer top-heavy shape and long-winged, rapid and direct flight is his loud rattling call, which fits so well the bird and his picturesque surroundings.

NIGHTHAWK. *Chordeiles virginianus.*

On cool days in summer, when a high pressure of dry air is accompanied by a sudden fall in temperature, insect life becomes greatly affected, and especially the winged insects remain dormant in seclusion, thus producing a temporary scarcity of food for certain birds which depend for their subsistence on insects which they can catch on the wing, chiefly the Nighthawks, Swifts, Flycatchers and Swallows. The only place where such insects are found in sufficient numbers on those days, is the surface of rivers and lakes, because the water is then warmer than the air, and evaporation supplies the air above the water with the moisture, which is so necessary to insect life. Most of the insects found on these days, such as Dragon and Damsel flies, May or Day flies and the great army of midges, gnats and mosquitoes, are born in the water and remain near it; others do not even leave its surface, such as the long-legged Water-striders and the social Whirligigs, and may be picked up by the flying bird.

The Nighthawks which are seen over the lake on such occasions, may have their two eggs or young far away on the roof of a high building in the city, for the flight of this long-

winged aerial acrobat is not measured by our miles, hundreds of which he daily traverses without effort in his ordinary vocation of gnat consumer. Thousands of gnats and midges are found buried in the stomach of this useful bird, whose capacious mouth is coated with a sticky saliva enabling him to capture scores of the minute insects by a single sweep with open mouth through a cloud of them.

RUBY-THROATED HUMMINGBIRD. *Trochilus colubris.*

Since the cold spring of 1907 Hummingbirds are not so common as they used to be. Birds are all more or less subject to numerical changes, brought about by a variety of agencies. A few heavy downpours of rain in June, killing the tender young, will greatly reduce the number of a species in a section of the country, as with such short-lived creatures as small birds the omission of one year's progeny would reduce the number of those returning to us the following spring by at least one-third. Especially the insectivorous birds, to which we must count the Hummer in spite of its fondness for nectar, suffer by a cool summer. Swallows and Swifts are sometimes visibly reduced, the latter chiefly by continuous rains at the time when they have small young in their frail nest, which, only glued to the wall, is loosened by the rain and falls with its contents to the bottom of the chimney.

Hummingbirds are not known to nest in the Garden, but become common among its flowers in the latter part of July, when migration from the north begins to reach us. Stopping in favorite places, they drift leisurely southward, spending three months in the transit through the United States. The males, traveling faster than the females and young ones, are nearly all gone by the middle of September, but the last of the species do not leave St. Louis before October. The drought of the summer and fall of 1908 caused earlier departure than usual, when nectar and insects became scarce and the flowers themselves withered. Jewel weed, usually a great favorite till October, had no attraction after the middle of September. As the red pollen of the Red Buckeye leaves an imprint on the Hummingbird's throat in early spring, so does

the Jewel weed cause the strangely white forehead by its sticky white pollen.

PURPLE MARTIN. *Progne subis.*

If bird houses were put up in the Garden, the Martins would undoubtedly accept them with thanks, for nesting facilities are not too common in St. Louis, and open places like the synopsis are always preferred to narrow city yards. The best bird houses are the inexpensive square boxes with a hinged lid or rather two lids, nailed together; one which fits tightly, the other a slanting roof. This arrangement not only sheds the rain, but lessens the heat in the box which under a single roof becomes unbearable. Ornamental houses with from ten to sixty rooms are offered for sale by manufacturers of bird-houses, but for various reasons single room houses are preferred by the writer, who has a long experience with Martin colonies, having had at one time a colony of forty pairs in the city. The occupants of single-room houses are easily watched and when it becomes necessary to remove a sparrow's nest, it can be done without disturbing others. Good boxes can be made of one-inch white pine boards, well painted, a good size for the room inside is ten by ten inches and six inches high; the entrance, two inches square, must open on the floor, which protrudes four inches to form a porch. On open ground twelve feet from the ground is high enough, in narrow city yards sixteen feet is better. For a pole a two-by-four yellow pine sixteen-foot scantling can be used setting it three to four feet in the ground after soaking the bottom part in crude carbolic acid or hot tar. A colony may be started with one pole holding two boxes, side by side or on opposite sides, and the number of poles may be increased as the colony grows larger from year to year. If the boxes are not occupied the first year, they will surely be the second year. Martins are sometimes afraid of new boxes, but once accustomed to them, they and their progeny return every year.

CEDAR WAXWING. *Ampelis cedrorum.*

The Cedarbird, as this bird is commonly called, is a visitor of the Garden in early summer. When about the first of

June the fruit of the large White Mulberry tree near the main entrance begins to ripen, troops of thirty or more pay short but numerous visits to it for a whole week without drawing the attention of the visitors of the Garden, for they come silently and go silently or nearly so, emitting only a fine lisping note, easily missed. While feeding they are perfectly still, knowing that they are trespassing. No harm is done on White Mulberry trees, as their fruit is insipid and not eaten by man, but when they invade the early cherry trees, they can do real damage by spoiling much more than they eat, returning to the same tree day after day, even hour after hour, if not scared away by shooting blank cartridges. Mulberry trees, both the White and the Red, should be planted in profusion in gardens, parks and orchards, where they would draw fruit-eating birds away from the cherries ripening at the same time. Birds have had their wild fruit in plenty before the white man came and cut down the trees, shrubs and vines, which supplied them. Now it seems our duty, in justice to our fellow-creatures, to return, in part at least, what has been taken from them, by growing many different kinds of fruit-bearing plants, combining the useful with the pleasing, since they are ornamental, hardy trees, shrubs and vines, easily raised from seeds.

EXPLANATION OF PLATE 1.

Above, male (at left) and female European Tree Sparrow; below, male (behind) and female House Sparrow: two-thirds natural size.

ILLUSTRATED STUDIES IN THE GENUS OPUNTIA—II.

BY DAVID GRIFFITHS.

OPUNTIA RUFIDA Engelm.

It was thought when Griffiths and Hare published a description of this species a couple of years ago that that would suffice to identify it. In that publication* it was specifically stated that *O. rufida* is a very different plant from *O. microdasys*. Later a fairly good description is presented together with notes on the variations in the species. This much of our work has been accepted, but the same authors† who accept this still distribute forms of *O. microdasys* into American collections as *O. rufida*, thus confounding the confusion.

The facts regarding the species appear to be as follows: Engelmann‡ described *O. rufida* and made the statement that it was closely related to *O. microdasys*. Botanists have taken this statement too literally altogether. When some one, therefore, found a red spiculed form of the typical yellow spiculed *O. microdasys* it was called *O. rufida*. Schumann, when he came to go over the material at his command, accepted this determination, and having accepted it, naturally came to the conclusion, as any one who knew anything about the species except that exhibited by a terminal joint would, that the yellow and red spiculed forms of *O. microdasys* represent one species. He was, therefore, considering the evidence at his command, justified in reducing *O. rufida* to a synonym of *O. microdasys*, for the red spicules of the one variety commonly turn yellow at a year or two of age. Near the southern limit of its growth, however, the spicules are sometimes permanently red. But Schumann never saw a specimen of the true *O. rufida*. Indeed, I doubt whether the species has been collected excepting by Trelease, Orcutt, and myself since its discovery.

The accompanying illustrations ought to fix in mind the style of plant that *O. rufida* really is. While Engelmann's

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* Bul. 60, Agr. Expt. Sta., New Mex., p. 82. (1906.)
† Smithsonian Miscel. Collections, v. 50, p. 4. (1898.)
‡ Proceedings of the Amer. Acad., **3**: 298. (1856.)

statement that it is related to *O. microdasys* is possibly true, it is, nevertheless, a very different plant. It is arborescent with a distinct trunk, while *O. microdasys* is a low, nearly prostrate species with never a true trunk.* Besides, the joints and flowers are different, as indicated in the original description. The fruits, which I have never seen until the past season, are also quite different from those of *O. microdasys*. They are greenish-red without, green within, decidedly acid, and have very thin rinds. The seeds have very thin integuments compared with the majority of the species of the genus *Opuntia*.

Regarding its relationships, it may be said that Engelmann was only partly right in his opinion. He never saw anything but a few cuttings. He was unacquainted with the habit of the plant. It resembles *O. microdasys* in having some pubescence and no spines. In color of plant body and spicules, however, it resembles *O. basilaris* more closely. Its real resemblances, however, are to the variety *Santarita* of *O. chlorotica*, but this is placed by the monographers in an entirely different group.

The specimen described by Griffiths and Hare† is the true *O. rufida*, but the notes appended regarding No. 8023 D. G. may represent a plant sufficiently different to warrant at least sub-specific rank. The fruits of that number appear from the very casual and imperfect examination to be quite different from those of true *O. rufida*, both in the type locality and in the vicinity of Torreon, Mexico. It is seldom that the fruits of the species in the type locality are entirely red on the outside. Usually the greater part of the fruit is greenish, with only a blush of red on one side. My collection No. 8023, therefore, requires further study.—Plates 3; 12, lower figure; 13, f. 3, 13.

Opuntia Dillei sp. nov.

Plant suberect or ascending, 15 dm. or more high and 18 or 20 dm. in diameter, open branching; joints subcircular to broadly obovate or ovate, often broader than long, sometimes 35 cm. in diameter and 2.5 cm. thick,

* Compare plate 3 with plate 12, lower figure.

† Bul. 60, Agr. Expt. Sta., New Mex., p. 82. (1906.)

but usually smaller, glaucous green turning to yellowish green and finally to scaly gray brown; areoles subcircular to obovate, about 6 mm. in longest diameter, enlarging irregularly in age and becoming conspicuously subareolate, the tissues of some of them proliferating into short columnar structures, invariably surrounded by yellowish brown, apparently dead epidermal tissue not later than the second year; spicules brown with yellowish tips, fading slightly with age, not numerous, scattered, unequal, not formidable, developing very unequally, usually none on sides of joints, commonly about 9 or 10 mm. long when fully developed in occasional areoles; spines mostly none or only a few, white or flesh colored, deeply tinted at base, flattened, but not annular or twisted, one erect or recurved, about 2.5 cm. long; flowers not seen; fruit purple throughout, large, subglobose, about 53 by 60 mm., edible, but with thick rind, smooth with subcircular areoles about 12 mm. apart, tawny with a small central bunch of brown spicules; seeds flattened, slightly angular, quite uniform in size, 3 to 4 mm. in diameter, with conspicuous marginal callus, about 0.5 mm. wide, with a narrowly rounded margin.

The species is most closely related to *Opuntia Engelmanni*, from which it differs in rarity of its spines, which are very conspicuous in that species. The fruits and seeds are also different. It appears to be a rare species. I have seen what I suspect is the same thing from one locality besides the type, both from the Territory of New Mexico. In the type locality about a dozen plants were found, all in situations inaccessible to livestock. Under cultivation the species becomes much more spiny than indicated above.

The type is No. 9460 D. G., collected in San Andreas canyon of the Sacramento Mountains of New Mexico, about 15 miles south of Alamogordo, August 3, 1908. I take pleasure in dedicating this species to Mr. A. B. Dille, who forwarded specimens of it to the United States Department of Agriculture a year or two ago. The type was secured from the same locality in which the original specimens were collected by Mr. Dille. The description was drawn in the field beside the type plants.—Plates 4, lower figure; 2, f. 10; 13, f. 7.

Opuntia Allairei sp. nov.

A spreading, open branching, prostrate or slightly ascending plant, 3 to 4 dm. high, and 6 to 9 dm. in diameter, tuberous rooted; joints obovate, often 9 by 19 to 20 cm., but more commonly 5.5 by 10 to 11 cm. in current year's growth, blue-green, rather glossy with somewhat tubercular raised areoles; leaves circular in section, subulate, cuspidate, pointed, about 6

mm. long; areoles subcircular to obovate, about 3 mm. in longest diameter, but increasing in size with age to even subcircular and 4 mm. in diameter, 2.5 to 3.5 cm. apart; wool tawny brown, giving its characteristic color to the young areoles which, however, is early obliterated by the spicules which are yellow, numerous, formidable, 2 to 4 mm. long, in a compact, mostly connivent tuft, filling nearly the entire areole; spines none, or an occasional one bleached white distally with tinted base, erect, flattened, twisted, faintly annular; flowers yellow; fruit light red, lighter or mottled within, smooth with very small subcircular areoles and but few inconspicuous spicules, obovate-clavate, about 2 by 4.5 cm.; seeds subcircular, rather thick, mostly a little less than 5 mm. in diameter, with narrow marginal commissure.

The species is more closely related to *O. vulgaris* than any other species, but it differs in shape and surface of joints as well as in habit and general aspect of the plant.

The type is No. 322, San Antonio garden. The original material was collected by Mr. Allaire near the mouth of Trinity River, Texas, in April, 1908. This has been grown and has produced flowers and fruit during the past season and was in bloom when received. The description is a compilation of field notes and laboratory studies from abundant living material. I take pleasure in dedicating this species to Mr. C. B. Allaire, who collected it and supplied the material from which plants have been grown and descriptions drawn.—Plates 5; 2, f. 2; 12, upper figure; 13, f. 9.

O. WHIPPLEI Engelm. & Bigel. and O. ECHINOCARPA Engelm. & Bigel.

On pages 102 to 105 of Bulletin No. 60 of the Agricultural Experiment Station of New Mexico, published in 1906, Griffiths and Hare discuss two somewhat distinct forms of *O. Whipplei*. An opportunity was had during the past season of studying these forms further. There is no doubt but that the two forms referred to in that publication are the same species. The differences are due to differences of altitude, rainfall or soil conditions, or all combined. This species regularly dwarfs, becomes more proliferous-fruited and more sterile in its seed habits as one goes down the mountain sides from the altitude of Fort Whipple, Arizona, where it may be 5 feet high or more.

On the other hand we have a most curious antithesis in *O. echinocarpa*. This reaches its maximum development of 6 or 7 feet high upon the deserts of Salt River Valley and its tributaries, but decreases in stature as one ascends the mountains. There is consequently the curious anomaly half-way up the San Francisco highlands on the west and south sides, of two dwarfed species of the same genus, one increasing in size toward the summit and the other increasing in size toward the valley. It is also equally strange that the dwarfed condition of both plants is proportionately less productive of seed than the normal larger forms. A few scattering plants of *O. echinocarpa* may be found as high as Fort Whipple, nearly the limit of *O. Whipplei*, but the latter never, so far as I have seen, reaches the desert mesas of the Salt River or Colorado valleys, where *O. echinocarpa* reaches its best development.—Plate 13, f. 11.

Opuntia tricolor sp. nov.

An erect to ascending, spreading, open branching species about 9 dm. high, and 10 to 12 dm. in diameter; joints large, obovate, blue-green turning to a grayish brown and scaly upon old trunks, commonly 20 to 22 by 30 cm. in current year's growth, frequently only 17 or 18 by about 25 cm., obovate and either broadly rounded above or obtusely pointed both above and below; areoles subcircular, about 3 mm. in diameter on the sides, commonly 4 mm. on edges in current year's growth, enlarging in age to 6 or 7 mm., about 3 to 3.5 cm. apart; wool very light tawny; spicules brown with yellow tips or brown throughout when young and always dull, dirty yellow in age; spines bright yellow turning abruptly reddish-brown to black at base, or when young some may be yellow throughout, erect, diverging but slightly, 2 or 3 but 6 or more in age and still erect and only slightly diverging, flattened, twisted, faintly annular, 5 to 7 cm. in length; flowers yellow; fruit reddish-purple.

The species is related to *Opuntia Lindheimeri*, from which it differs in shape of joints, in color, length, position, and general aspect of spines. It is a very striking species and so distinctly different from any of the described forms as to be very clearly marked. The spines are much longer, yellower distally and darker at the base than any of the forms of the variety *cuija*,* with which it also has affinities.

* Bull. 60:44. *pl. 2, figs. 1 and 2.* (1906.) Agricultural Experiment Station of New Mexico.

The type is specimen No. 8651 D. G., prepared October 2, 1908, from cultivated specimens collected March 29, 1907, near Laredo, Texas, under the same collection number. The description is a compilation of two sets of notes, one taken in the type locality and the other beside the cultivated progeny, supplemented by laboratory studies.—Plate 4, upper figure.

Opuntia caerulescens sp. nov.

Plant open, loose branching, erect, 10 to 15 dm. high and arborescent in form, with a distinct trunk 5 to 8 cm. in diameter; lateral branches (and fruits) breaking off readily and starting new plants, commonly few-spined, 2.5 to 8 cm. long, or subglobose, and resembling fruits in all but the flower scar, others 1.5 to 3 dm. or more in length and more spiny, the central stem losing all semblance of jointedness, glaucous, dark blue-green, and commonly tinged with copper color on one side, changing irregularly to a dirty gray and epidermis falling off in thin papery shreds in age, tuberculate with low, not laterally compressed tubercles about 3 mm. high having gradually descending slope below and more abrupt above where the areole is situated, entirely disappearing on old wood; leaves circular in section, subulate, cuspidate pointed, 5 to 6 or 7 mm. in length; areoles obovate to triangular, 2 to 4 mm. in length on last year's wood, brownish when young but soon turning to a dirty gray, enlarging with age and becoming distinctly sub-areolate; spicules dark reddish-brown, 2 to 3 mm. long, in a compact bunch in upper portion of areole or, at base of some joints, filling the entire areolar area; spines, mostly 1, commonly gray-white at base and reddish-brown distally with sheaths not very loose and dark straw-colored, 1.5 to 2 cm. long, with frequently 2 smaller lateral ones and 3 to 4 evanescent, dirty, blackish bristles, not increasing in either numbers or length with age; flowers greenish-purple, about 2 cm. in diameter, with petals obovate, rounded above, cuspidate pointed, sepals greenish-red, cuspidate pointed, filaments greenish at base, purplish-red above, $\frac{2}{3}$ to $\frac{3}{4}$ the length of the style, which is white below, purplish above, 12 to 15 mm. in length, with stigma white or slightly purplish tinged, 4-parted; ovary obovate, 2 to 3 cm. long, tuberculate, areolate, bearing circular areoles 1 to 2 mm. in diameter and about 6 or 7 mm. apart, beset with abundant bright reddish-brown spicules about 2 mm. in length, proliferous, remaining attached to the plant year after year.

The species is most closely related to *Opuntia Kleiniae*, from which it differs in nature and length of spines, color and general appearance of plant body, as well as in the nature of the fruit. The plant has two distinct forms, one more open, fertile, and less proliferous than the other. When grown to-

gether under cultivation the two forms are indistinguishable, although quite different in habit in their natural habitat.

The type is No. 7632 D. G., prepared from a cultivated specimen April 23, 1908. The original material was collected at San Luis Potosi, Mexico, March 12, 1905. The description is a compilation of a partial description written in the type locality and a more complete one made in the field, of the cultivated, mature, three-year-old plant, supplemented by studies of the living material in the laboratory.—Plates 6, upper figure; 2, f. 9

Opuntia gilvescens sp. nov.

Plant low, prostrate to slightly ascending with main branches on edge on ground and secondary ones short, erect or ascending from them, 7 to 8 dm. high and about 12 dm. in diameter, loosely branched and symmetrical with main branches usually 3 or 4, radiating in all directions; joints obovate, very pale, smooth, glossy, glaucous green changing to a light yellow-green not later than beginning of second year, commonly 20 by 25 cm. but mostly smaller and 12 to 16 mm. thick; areoles obovate, about 4 to 5 mm. in longest diameter, tawny-yellow, enlarging in age to subcircular and often becoming 6 or 7 mm. in diameter, 3 to 4.5 cm. apart; spicules always yellow, mostly about 4 mm. long, nearly or quite surrounding the darker tawny wool, but more abundant above, increasing in age to 9 or 10 mm. in length, mostly in more or less plainly distinguishable concentric circles, the new ones being inside of the old, which become dirty yellow, the marginal areoles completely and compactly filled with spicules after first year, marginal ones more loosely and unequally arranged; spines not numerous, at first translucent, soon becoming bleached white distally with dark bases, and with age changing through flesh-color to chalky white throughout, or the bases may remain somewhat tinted, tips always translucent, 1 or none to 4, mostly less than 2.5 cm. in length the first year, but sometimes even 4 cm., increasing in age to as many as 6 and somewhat longer also, erect, divergent, but sloping downward slightly in age, flattened, annular, seldom twisted; flowers yellow; fruit a light, glossy red with often a tinge of purple below, rind greenish and pulp lighter green, obovate, its areoles about 1.5 to 2 cm. apart, tawny, permanently yellow spicular; seed flattened, irregular, angular, 4 or 5 mm. in diameter, with a prominent, rounded, irregular roughened marginal callus about 1 mm. in width, narrowing toward the prominently notched hilum.

The species belongs to the *O. phaeacantha* group but differs from that species in its many variations in being a larger jointed plant, being lighter and more glossy in color, and decidedly different in the nature and number of its spines. It

inhabits sparingly the gravelly banks of arroyos in the open foothills region just below the steep mountain ascents.

Attention should be called here to the abnormality in some of the fruits shown in the photograph. Many are affected by a dipterous parasite which deposits its eggs in the young ovary and emerges in the imago stage the following April. In all fruits so injured the areoles, wool, and spicules are enormously developed, and in many cases the latter show traces of brown. As stated in a previous publication, the effect of this insect is to turn the young fruit into a vegetative organ, all of the seeds becoming aborted. It remains attached to the plant until the following season, and drops off after the insects have escaped. Engelmann has figured what appears to be this same dipterous larva effect in Pacific Ry. Report, **4,** *pl. 7, f. 3.* 1856.

The type is No. 9619 D. G., collected in the foothills of the Santa Rita Mountains, Arizona, September 23, 1908. The description was drawn in the field beside the plant when the type specimens were collected.—Plates 7; 2, f. 5; 13, f. 6.

Opuntia congesta sp. nov.

A low, spreading, very compactly branched, cylindrical-jointed species, 4 to 5 dm. high and 9 to 12 dm. in diameter, having such a congested habit of growth that there is invariably a great deal of dead stuff in the center; joints variable, 1 to 2 dm. long and 8 to 12 mm. in diameter, tubercular with a low, flat tubercle about 8 mm. long, the upper slope more abrupt than the lower, sharply defined by a slightly but sharply sunken dark green line, which although becoming less distinct is perfectly distinguishable for two or three years, bright, moderately dark green turning dull and darker to even glaucous and finally scaly, gray-black upon old trunks; leaves 3 to 5 mm. long, subulate, mucronate, circular in section, and reddish tinged toward tip; areoles broadly obovate, 3 to 5 mm. long and about 1 cm. apart, tawny when young, but turning through light gray to black in age but having a proliferating tissue in its upper portion which develops new wool even upon three or four-year-old wood, this new growth continuing tawny during the current year, often eclipsing the earlier blackened growth, thus elevating the areolar area slightly higher than its original flattened state, often subareolate even when young; spicules yellow in compact tuft in upper portion of areole, commonly less than 1 mm. long, increasing slightly but less than 2 mm. and more numerous with age, often scarcely visible until late in the first season; spines normally 1, sometimes 2 or even 3, nearly erect, when more than one the lower more or less recurved and in age in all cases always sloping downward, medium loosely

sheathed with white glistening sheaths which are yellow distally, but spines at first red turning to flesh-colored, becoming chalky white later; flowers not seen; fruit distinctly and characteristically proliferous but usually producing some seed, tubercular, like stem even in age with the same sharp limiting dark lines surrounding the tubercles, its areoles obovate, about 2 mm. in greatest diameter, bearing a prominent bunch of yellow spicules about 1 mm. in length and the upper one usually bearing a typically sheathed spine 6 to 7 mm. long and 2 to 4 delicate, fugacious bristles 2 to 3 mm. long in lower portion of areole in addition to the regular tuft of shorter spicules, green or slightly yellowish tinged when mature but always greenish within, very variable in size, the proliferous forms being 1.5 cm. by 3 to 4 cm., while the less proliferous and fertile forms are 1 cm. by 1.5 to 2 cm.

The relationships of this species are somewhat ambiguous. It has some ear marks of *Opuntia neoarbuscula*, which it resembles in habit, but from which it differs decidedly in its proliferous, tuberculate fruits, fewer spines, usually poor seed habits, and tuberculate stems. It resembles in some respects *Opuntia Kleiniae*, but its habit is entirely different and the fruits and stems are too tubercular to be admitted into that species. It grows associated with a dwarf form of *Opuntia Whipplei*, some varieties of which it resembles in the tuberculation of its fruits, but these fruits are smaller, the plant is in general much less spiny, the stems are smaller and less tuberculate. On the whole, it probably belongs closer to *Opuntia neoarbuscula* than any other species. A single joint or some stems might be selected which would pass fairly well for *Opuntia arbuscula*, but the fruits will not admit of its being referred to this species.

In the above description the spicules are said to be yellow, and this is true of the type specimen. However, specimens were found after the description was written having reddish-brown spicules. So we must consider the spicules in this species, as in scores of others, to vary from yellow to reddish-brown when young. Upon old joints the reddish-brown spicules become a dirty yellow.

The type is No. 9568 D. G., collected near Hillside, Arizona, September 10, 1908. The description is a compilation of field notes taken beside the yellow-spiculed plant supplemented by laboratory studies of both varieties.—Plates 8; 2, f. 4 and 7; 13, f. 5.

Opuntia cañada sp. nov.

Plant erect and ascending, spreading, rather compactly branched, about 9 dm. high and 12 or more dm. in diameter, growing commonly in thickets, but also frequently as isolated individuals; joints obovate to ovate, mostly broadly rounded above, about 16 by 22 cm. in second year joints but quite variable, yellowish, smooth and shining green when young, turning darker and more or less glaucous the second year; leaves circular in section, subulate, mucronate pointed, about 1 cm. in length; areoles subcircular, brown when young, turning through dirty gray to black, but often retaining a brown center surrounded by a grayish or black zone owing to continued development of new wool from the central areolar area, broadly obovate, 5 mm. in greatest diameter but increasing in size with age and becoming subcircular, very prominent; wool light tawny when removed, but dark brown in situ, prominent; spicules very variable, often few or none until 1 or 2 years old, when they become conspicuous, unequal, often 12 mm. in length, upon last year's joints when present they are 2 to 3 mm. long, always unequal, scattered, light reddish-brown when young, turning yellow or dirty yellow in age; spines exceedingly variable in every characteristic, bleached white with usually tinted bases mostly completely white after a year or two, commonly yellow when young, but soon presenting the bleached, white appearance, flattened, sometimes twisted slightly, never annular, but minutely longitudinally striate under a lens, 1 to 4 or 5, mostly 2 or 3, 12 to 15 mm. in length on second year joints, but frequently increasing in both length and numbers upon old trunks; flowers yellow with tinge of red or deep orange on inside at bases of petals and often outside as well, stigma bright green and style varying from white to reddish-tinged; fruit light red, often mottled yellow and red, usually not uniformly colored, rind greenish-yellow and pulp lighter in color, its areoles usually gray on border and tawny brown within, the spicules being very light brown; seeds flattened but mostly quite thick, angular, between 3 and 3.5 mm. in diameter, with a prominent, rounded, roughened marginal callus, and prominently notched hilum.

The species is most closely related to the spiny form of *Opuntia laevis*, from which it differs in greater spininess, difference in color of plant body, larger, more robust plant, and in the nature of its fruit. The seeds of the two species are also different. It commonly grows upon the sides of arroyos and canyons from the lower foothills to the beginning of the oak timber and is rather common throughout the locality mixed with the spiny forms of *Opuntia laevis*, from which it is sometimes difficult to distinguish it, except in flower and fruit.

The type is No. 9593 D. G., collected in the foothills of the Santa Rita Mountains, Arizona, September 17, 1908. The

description is a compilation of four sets of field notes supplemented by laboratory studies.—Plates 6, lower figure; 2, f. 6; 13, f. 2 and 12.

Opuntia megacarpa sp. nov.

An ascending, spreading, bushy, open-branched plant 6 to 10 dm. high and 12 to 15 dm. in diameter, the main branches resting on edges of joints and ascending at the extremities, the secondary ones of a joint or two in length growing erectly from them; joints obovate, mostly pointed above, glaucous, turning yellowish-green the second year, commonly 20 by 25 cm. and often widest at middle and tapering each way, often slightly purplish about the areole; areoles subcircular to obovate, 4 to 6 mm. in diameter, tawny brown turning gray in age and its tissues proliferating into a convex gray surface when not covered with spicules; spicules reddish brown in a rather compact, quite equal, crescentic bunch in upper portion of areole, about 3 mm. long but increasing with age in both numbers and length, becoming unequal and even 12 or 13 mm. in length, sometimes filling the entire areole; besides the regular spicules there are a few scattering fugacious bristles all through the areolar area of young joints; spines very long, formidable, often 7 or 8 cm. in length, one or none below to as many as six above, 8 cm. in length, changing successively from white through mottled flesh-color to reddish-brown at base, and in age dull, dirty brown throughout, tips always more or less translucent, bone-like even in age, flattened, twisted, sometimes striate, very faintly when at all annular, and this lasting only through the growing season, at first spreading in all directions but later sloping downward; flowers not seen; fruit dull, purplish red, often with a bleached yellowish appearance, about 38 by 82 mm., rind greenish, streaked with red, and pulp greenish; seeds very large, flattened, irregularly angular, often 8 mm. in diameter but more commonly about 7, with very prominent, more or less wavy, sharp marginal callus about 1.5 mm. wide, prominently notched at hilum.

It is difficult to express satisfactorily the relationship of this species. The spines in color might pass for some forms of *O. phaeacantha*. So might the seeds, so far as everything but size is concerned. The general habit of the plant is that of *Opuntia procumbens*, but, as indicated in the description, it is difficult to admit it even into the same group with either one of these species. Its main characteristics are its spininess, large, long fruits, and exceedingly large flat seeds.

The type specimen is No. 9501 D. G., collected near Banning, California, August 25, 1908. The description given above is a revision of one made in the field when the plant was collected.—Plates 2, f. 3; 13, f. 10.

Opuntia texana sp. nov.

Plant erect to ascending, spreading, rather open, about 9 dm. high and 12 to 15 dm. in diameter when full grown; joints obovate, often 20 by 28 cm., but more commonly smaller, about 16 by 20 cm., glaucous, gray-green, turning to a scurfy brown and finally dull, dirty gray and scaly upon old trunks; areoles obovate, 3 to 4 mm. in longest diameter on sides of joints but larger and subcircular on the edges, all becoming larger and subcircular with age, brown turning to dirty black or obscured entirely by the spicules in age, 3.5 to 5 cm. apart on sides of joints; wool brown in situ, light tawny when removed; spicules yellow, formidable, unequal, scattered, but always more numerous above, mostly 10 to 13 mm. in length, becoming both longer and more numerous with age; spines yellow throughout and remaining so for two or three years, then becoming dull, dirty yellow, slightly sloping downward, mostly one on sides of joints first year and 1 to 3 or 4 on edges, increasing with age to as high as 6 or 8 but mostly 3 or 4, the longest 5 to 6 cm. long, mostly 2.5 to 4 cm., flattened, twisted, faintly annular; flowers yellow, stigma deep, dark green, 6 to 9 parted; fruit obovate, purplish red throughout, about 4 by 6.5 cm.

This species is most closely related to *Opuntia Lindheimeri*, from which it differs mostly in the color, arrangement, and position of its spines. It is usually more productive of fruit, more subject to disease, and less vigorous than that species.

It has been with considerable difficulty that I have been able to settle upon the exact type of *Opuntia Lindheimeri*. The species was collected originally by Lindheimer at New Braunfels, Texas, and forwarded to Dr. Engelmann, who evidently grew the cuttings forwarded to him in the greenhouse. The only specimens preserved are imperfect ones which he cultivated under artificial glass house conditions at St. Louis. At New Braunfels, however, the largest and most numerous plants are those of what I consider to be a typical *Opuntia Lindheimeri*. The species described above also occurs commonly, but not so abundantly as the other. However, I am free to confess that the type specimen, as preserved in the Engelmann collection, might easily pass for either species. There is one statement in the Engelmann description, "setis flavidis," which would lead one to suspect that Engelmann possibly might have had the species here described rather than *Opuntia Lindheimeri* as I understand it; but, on the other hand, he states that the plant is erect, often six or

eight feet high, which applies much better to *Opuntia Lindheimeri* than to this species. Again, the spines of *Opuntia Lindheimeri*, under many conditions, might be considered yellow rather than white. However, should the translucent, bone-like appearance of the spines of some forms of *O. Lindheimeri* be called yellow, they are very different indeed from the yellow of the species here described.

The type is No. 9640 D. G., collected at San Antonio, Texas, October 1, 1908. The description is a compilation of one made when the type specimen was collected and previous field notes, together with laboratory examinations of fresh living material.—Plates 9; 13, f. 1.

Opuntia arizonica sp. nov.

A prostrate to ascending species, 8 to 10 dm. high and often widely spreading, sometimes 2.5 m. in diameter but usually about 18 dm., the joints of the main branches mostly on edge and radiating outward but often flattened upon the ground; joints large, subcircular, commonly 2.7 dm. in diameter but mostly about 22 cm., glaucous, blue-green but becoming yellowish green with age; areoles tawny, turning gray-black, large, obovate, about 8 mm. in longest diameter on sides of joints but on edges some, at least, are subcircular and often 10 to 13 mm. in diameter, not enlarging much with age but finally becoming black, and central tissue proliferating irregularly into a low cone; spicules reddish-brown, with abrupt yellow tips, becoming lighter with age, somewhat mottled brown and yellow, about 6 to 10 mm. long, unequal, scattered, but more abundant in upper portion of areole, increasing with age from central proliferating areolar tissue, sometimes becoming 12 or 13 mm. long, sometimes flattened and twisted; spines large, stout, formidable, reddish-brown throughout, soon bleaching distally, becoming irregularly mottled reddish-brown and flesh-colored, then yellow with reddish bases, or yellow throughout, and finally on very old joints dirty gray, flattened, twisted, faintly annular in color but not in structure, 2 to 6, mostly 3 or 4, erect, divergent, but the lower ones usually recurved, and all having a tendency to slope downward in age, the longest 4 to 5 cm. in length; flowers not seen; fruit large, subglobose, somewhat tubercular, pitted at apex, reddish-purple with greenish rind which has some red in its vascular system and pulp mottled, its areoles large, subcircular to obovate, about 4 mm. in diameter, tawny to light gray, bearing spicules about 3 mm. long, and in upper areoles 1 or 2, delicate, fugacious, mottled yellow and brown spines 12 to 25 mm. in length; seeds flattened, angular, quite uniform in size but somewhat irregular in shape, with marginal callus, rather prominent and 1 mm. wide, with distinct deeply notched hilum, about 4 mm. in diameter.

The species differs from *Opuntia Engelmanni*, to which it is most closely related, especially in habit, and in nature of spines and fruit. No. 9560 D. G. is considered to be the same, although its spicules are yellow and its spines much lighter in color. The color of spines and spicules, while of value in taxonomy, can not be used to differentiate species unless accompanied by other characters. There are a score or more of species which have both yellow and brown or reddish-brown spicules.

The type is No. 9559 D. G., collected near Kirkland, Arizona, September 8, 1908. The description was drawn in the field beside the brown spiculed form.—Plates 10; 2, f. 8; 13, f. 8.

Opuntia subarmata sp. nov.

Plant tall, rather compactly branched, erect or ascending, making a shrub 12 to 15 dm. high and 18 or more dm. in diameter; joints broadly oval to obovate, commonly 17 to 25 cm. in diameter, broadly to narrowly rounded above, blue glaucous green changing through yellowish to brownish and finally gray scaly; areoles elliptical to ovate or even subcircular, 3 to 6 mm. in longest diameter, 3.5 to 4.5 cm. apart, tawny changing to gray or black, enlarging but slightly with age; spicules yellow, about 2 mm. in length, never formidable and not increasing with age; spines none; fruit purple throughout, bearing light, tawny, subcircular areoles, 1 or 2 mm. in diameter, having a small central tuft of yellow spicules; seeds flattened, regular, about 4 mm. in diameter, prominently notched at hilum, with marginal callus about ¾ mm. in width.

The species is rather closely related to *Opuntia texana*, which in turn belongs to the *O. Lindheimeri* group. It differs from that species mainly in the absence of spines, difference in areoles, and a decidedly larger seed than either of the foregoing species.

The type is No. 9422 D. G., collected near Devils River, Texas, July 22, 1908. The description was written beside the type plants in the field.—Plates 11; 2, f. 1; 13, f. 4.

EXPLANATION OF PLATES.

Plate 2.— Diagrams of *Opuntia* fruits, natural size. Outlines were prepared in the field by bisecting the fruit in the median longitudinal plane. The cut surface was then placed upon a piece of paper and a pencil tracing made of it. This plate is prepared from tracings of these field sketches. 1, *Opuntia subarmata;* 2, *O. Allairei;* 3, *O. megacarpa;* 4 and 7, *O. congesta,* the first is the sterile form of the fruit; 5, *O. gilvescens;* 6, *O. cañada;* 8, *O. arizonica;* 9, *O. caerulescens;* 10, *O. Dillei.*

Plate 3.— Above, *Opuntia rufida* from type locality near Presidio, Texas. The plant is not quite normal on account of the main stem having been injured. Below, a cultivated two-year-old plant from a cutting secured near Torreon, Mexico.

Plate 4.— Above, *Opuntia tricolor,* a two-year-old plant under cultivation from a single joint cutting. Below, *O. Dillei* upon limestone ledges in the Sacramento Mountains of New Mexico.

Plate 5.— *Opuntia Allairei,* joints and fruit (see also plate 2), all of current year's growth.

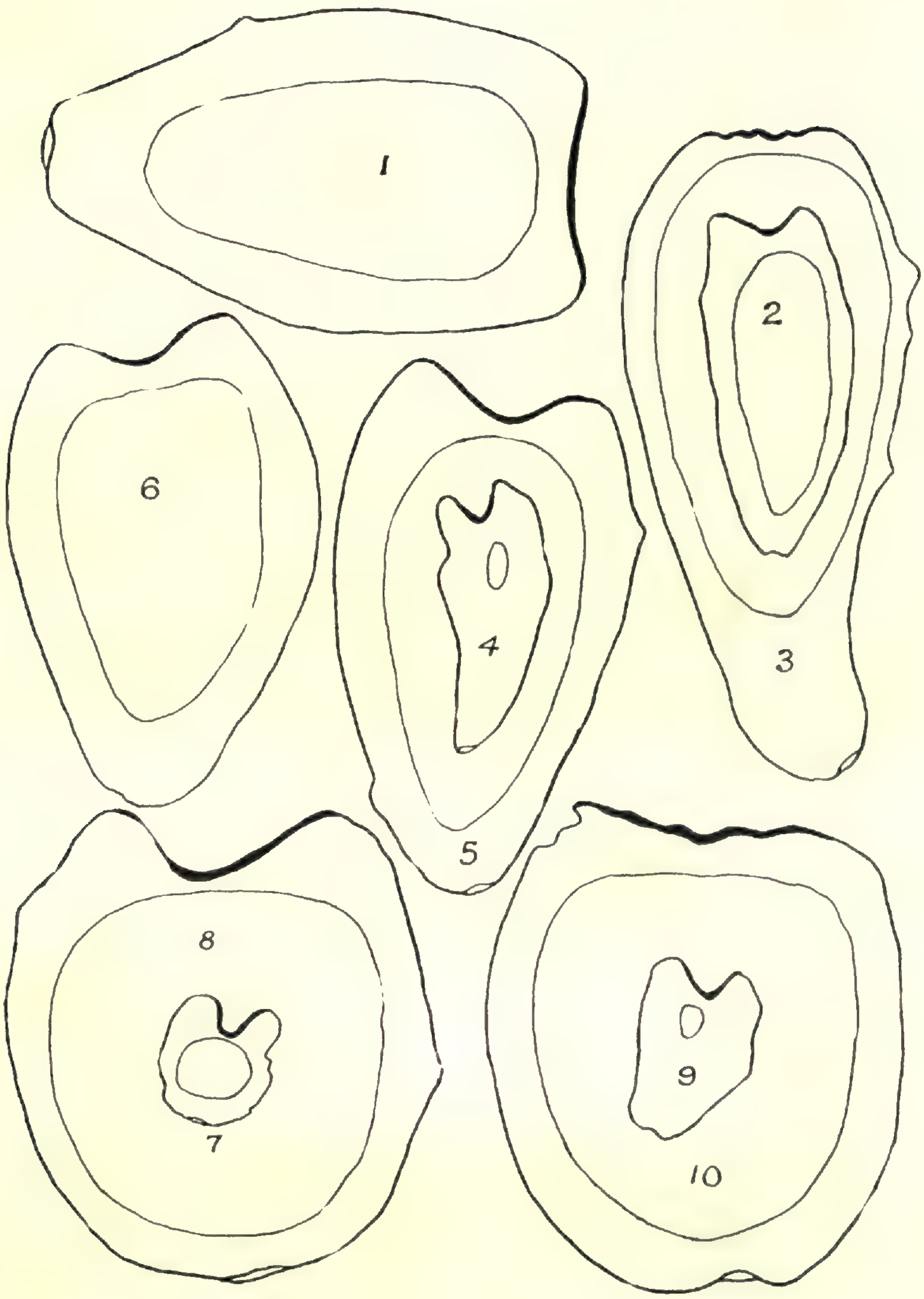
Plate 6.— Above, *Opuntia caerulescens,* marked by the hat. Cultivated four-year-old specimens. Below, *O. cañada.*

Plate 7.— *Opuntia gilvescens.* Plate 8.— *Opuntia congesta.* Plate 9.— *Opuntia texana.* Plate 10.— *Opuntia arizonica.*

Plate 11.— *Opuntia subarmata* upon calcareous soil of western Texas.

Plate 12.— Above, *Opuntia Allairei,* one season's growth from single joint cutting. A flower was produced on last growth of season. Below, *O. microdasys.* Compare the habit in this figure, which is from a native plant in the State of San Luis Potosi, Mexico, with that of *O. rufida* in Plate 3.

Plate 13.— Opuntia seeds, natural size. 1, *Opuntia texana;* 2, *O. cañada;* 3, *O. rufida;* 4, *O. subarmata;* 5, *O. congesta;* 6, *O. gilvescens;* 7, *O. Dillei;* 8, *O. arizonica;* 9, *O. Allairei;* 10, *O.megacarpa;* 11, *O. echinocarpa* (there are forms of this species with smooth seeds); 12, *O. cañada* (compare with fig. 2); 13, *O. microdasys.*



FRUITS OF OPUNTIA.

OPUNTIA RUFIDA.

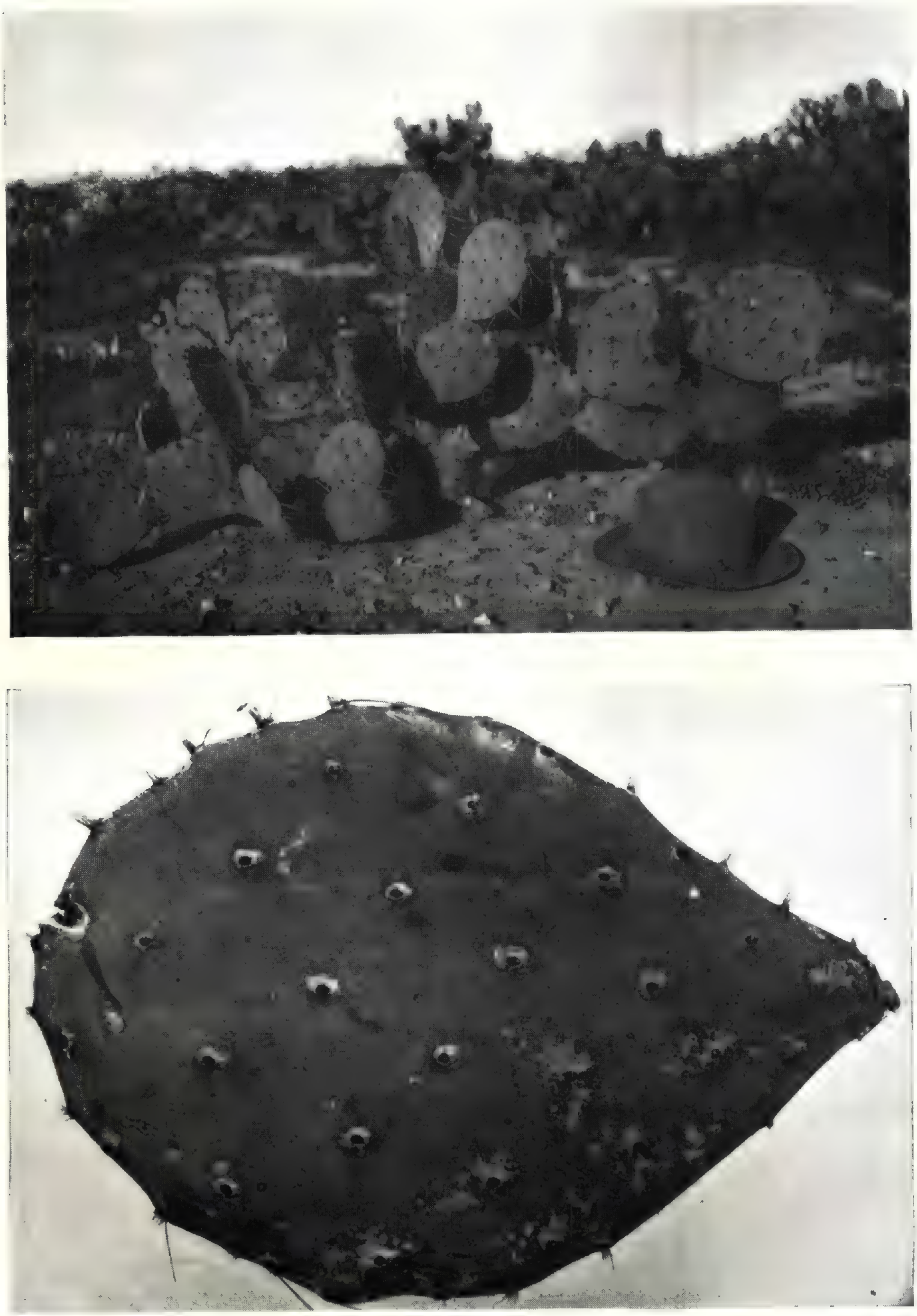
OPUNTIA TRICOLOR AND O. DILLEI.

OPUNTIA ALLAIREI.

OPUNTIA CAERULESCENS AND O. CAÑADA.

OPUNTIA GILVESCENS.

OPUNTIA CONGESTA.

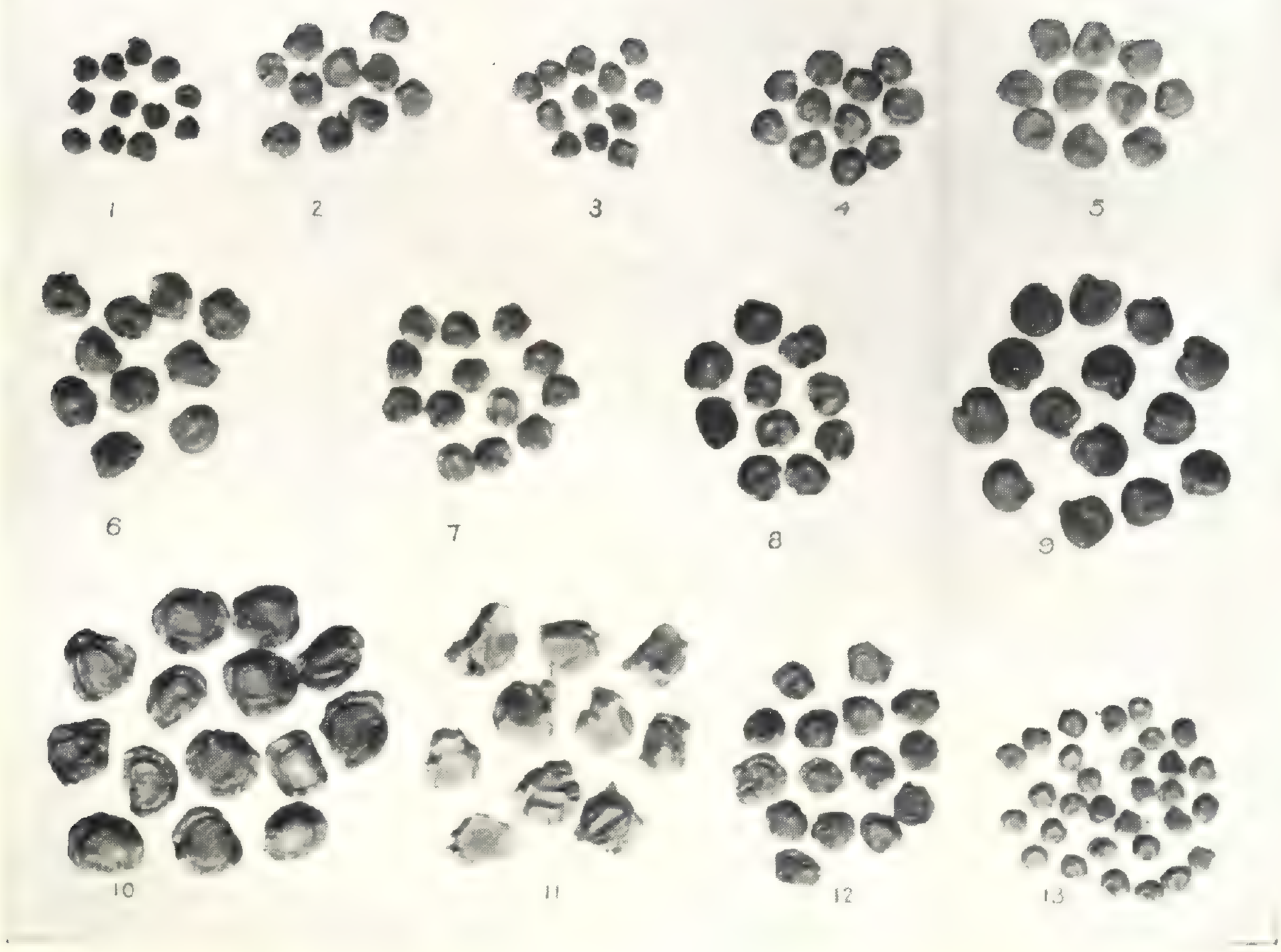


OPUNTIA TEXANA.

OPUNTIA ARIZONICA.

OPUNTIA SUBARMATA.

OPUNTIA ALLAIREI and O. MICRODASYS.



SEEDS OF OPUNTIA.

VARIATION AND CORRELATION IN THE FLOWERS OF LAGERSTROEMIA INDICA.

BY J. ARTHUR HARRIS.

Lagerstroemia indica, frequently grown as an ornamental shrub in the United States under the common name of Crape Myrtle, is a member of a genus of about thirty species*, belonging to the Lythraceae, a family of considerable interest to floral ecologists through the researches of Darwin. For the most part the genus is confined to the oriental and austral Asian region, and this species seems to be the only one extensively cultivated for ornamental purposes.

Briefly, the structure of the flower is as follows: The petals are unguiculate, with an oval to orbicular crispate limb. The numerous stamens have filiform filaments and elliptical anthers with broadly pulviniform connectives. The greater number of the stamens are bright yellow in color, but one in front of each sepal is usually larger, both as to filament and anther, and of a reddish instead of a yellow color. In young buds the anthers are not distinguishable by their color, both kinds being a light yellow. The characteristic colors are developed as the buds grow older.

Biological observations on the flowers are very few. Darwin, in his classic paper on *Lythrum*†, was the first to notice the species in this respect. He found it strongly variable in the number of stamens, and suggested as a cause its growth in the hothouse. He usually found five long stamens with thick flesh-colored filaments bearing anthers producing green pollen, and from 19 to 29 small stamens with yellow filaments and anthers producing yellow pollen. In other cases, however, he found those with only one to four larger stamens with anthers producing green pollen, which in some cases was replaced by that which was yellow in color; one anther, indeed, offering the peculiar case of one locule containing bright yellow

* Koehne, E. Lythraceae. Das Pflanzenreich. 19. 1903.
† Darwin, C. Jour. Linn. Soc., Bot. 8: 176. 1865.

and the other bright green pollen*. He also suggests here and in his "Different Forms of Flowers," that *L. indica* may be a heterostyled form†. Fritz Müller‡ fertilized a *Lagerstroemia*, infertile to its own pollen, with yellow and green pollen from another variety or species in other gardens. Both kinds produced apparently good seed, though only some of those from the green pollen germinated. In his paper on dimorphism in the anthers of pollen flowers, Hermann Müller§ assigned the same interpretations to the structure of *Lagerstroemia* as to other forms in which there is a color dimorphism in the anthers, namely, that the central yellow anthers serve as organs of attraction and furnish booty to the visitor while the blue or green anthers, which are not observed by the visitors because of their resemblence in color to the background formed by the petals, furnish pollen for fertilization. Koehne¶ suggests that in respect to this character the genus *Lagerstroemia* is still in the process of evolution, since the forms may be arranged in a complete series from those in which there is no differentiation in the androecium to those in which the dimorphism of the stamens is most highly developed. The reference to green stamens by some writers is apparently a slip of the pen. Knuth in his Handbook reviews Müller's work. Koehne in his recent monograph suggests the possibility that the forms in which the stamens are not dimorphic have been reduced from those in which the dimorphic condition prevails, but he inclines much more to the opinion that the dimorphism is in a state of evolution, supporting this

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* I have seen several stamens intermediate in size between the typical large and small. Darwin noticed one petal with a furrow near the base of the limb containing pollen. In several flowers I found one or all of the large stamens with the anthers more or less completely metamorphosed into the orbicular crispate limb, while the filament represented the claw of the typical unguiculate petal. I mention these cases because of the similarity of the filament of the large stamens to the claw of the petal.

† Koehne states that all species are homostylous. The styles of all the flowers I have seen are of sensibly the same length.

‡ Müller, F. Nature. **27**: 364. 1883.

§ Müller, H. Kosmos. **13**: 254. 1883.

¶ Koehne, E. Engler's Bot. Jahrb. **6**: 45. 1885.

view by the statement that the species in which the occurrence of only one kind of stamens is most typical, *L. speciosa*, is by far the most widely distributed and may represent the oldest species of the genus.

Since this species has attracted so much attention, it seems worth while to place on record the observations which I have made on the variability of the flowers of a lot of plants growing at the Missouri Botanical Garden. In putting these observations into print, I wish to make very clear the fact that I do not submit the constants secured here as typical of the entire species. They are based on several hundred flowers from about a dozen individuals. The probable errors of the constants calculated in this paper are low, but these show merely the degree of reliability of the constants for the series of material in hand, and must not be interpreted as fixing the limits of trustworthiness of constants for the species as a whole. At St. Louis the shrubs must be taken into the house during the winter. To gain a satisfactory knowledge of the variability of the flowers the data should be collected in the South, where the plant is hardy out of doors; or better still, in its native habitat. Of course the ideal thing would be to have comparative biometric studies of several species of *Lagerstroemia* growing in their own habitats, where their ecological relationships might be satisfactorily investigated. The hope of interesting some one who has opportunity to carry out this work as it should be done, is the chief object of this paper. My observations merely emphasize again the importance of what others have written, and contribute a little to the quantitative data of the subject, leaving the working out of satisfactory constants to represent the species as a whole to some one who has more adequate materials.

In 1903, 1904 and 1907 I was able to secure countings of sepals, petals and large stamens from the shrubs in the Missouri Botanical Garden. It was not possible to count the small stamens, as well, because of lack of time. The material was collected primarily for some physiological work which required the stamens to be removed and used quickly. Even had time been available their number is so large that it

would have involved a considerable amount of labor. The plants which furnished the material were of varying ages. It is not safe to refer any differences observed in the constants from year to year to any conditions under which the plants flowered, for the proportion of the flowers which each individual contributed may vary from year to year. The data are given in the form of correlation tables showing the relationship between sepals and petals, sepals and stamens, and petals and stamens in Tables I to VIII.

Considering first the variabilities, we note that the distributions are very irregular, falling wide of the symmetrical Gaussian distributions which some biologists of great reputation still hold to represent the variability of all organisms. But it will hardly be profitable to discuss skewness or other statistical characteristics of these distributions. For such work larger series grown under less abnormal conditions should be used.

TABLE A. VARIATION CONSTANTS FOR LAGERSTROEMIA.

Series	Average and Probable Error.	Standard Deviation and Probable Error.	Coefficient of Variation.
Sepals, 1903.....	5.879±.029	.433±.021	7.362
Sepals, 1904.....	5.969±.008	.338±.006	5.764
Sepals, 1907.....	5.758±.011	.441±.008	7.657
Petals, 1903.....	5.879±.029	.433±.021	7.362
Petals, 1904.....	6.024±.006	.260±.005	4.316
Petals, 1907.....	5.718±.012	.488±.009	8.525
Stamens, 1903...	4.020±.150	2.214±.106	55.061
Stamens, 1904...	5.996±.007	.273±.005	4.557
Stamens, 1907...	3.686±.052	2.093±.037	56.719

The means and standard deviations, with their probable errors, and the coefficients of variation, are given in Table A for the three characters studied.

Comparing the constants for the three years, we see that the means for sepals and petals agree fairly well, though differing by several times their probable errors. The means of the large stamens, however, are widely different in the

three collections. Perhaps the differences in the standard deviations show somewhat greater irregularities than do the means. Turning to the coefficients of variation for the three characters, we note that while there is considerable fluctuation from series to series, and from year to year, for the sepals and petals, the constants are of the same general order of magnitude. For both sepals and petals they are conspicuously lower in 1904. For the large stamens, the values for 1903 and 1907 are in close agreement, but differ widely from that for 1904.

For comparison with these constants we note that Pearson and his associates* found the coefficient of variation for *Ficaria ranunculoides* to range from 3.24 to 22.02 for the sepals, from 5.34 to 14.60 for the petals, and from 12.12 to 18.77 for the stamens, in various habitats. Calculating the coefficients of variation from Yule's† means and standard deviations for sepals of *Anemone nemorosa* from a series of habitats, I find that they range from 9.8 to 13.4. I have also calculated the coefficients of variation for the lateral flowers of *Adoxa* from the data given by Whitehead‡ and find that the values range from 7.35 to 10.41.

TABLE B. CORRELATION IN LAGERSTROEMIA.

Relationship and Series.	Correlation and Probable Error.
Sepals and Petals in 1903	1.000 ± .000
Sepals and Petals in 1904	.724 ± .012
Sepals and Petals in 1907	.879 ± .006
Sepals and Stamens in 1903	.082 ± .067
Sepals and Stamens in 1904	.438 ± .020
Sepals and Stamens in 1907	—.046 ± .025
Petals and Stamens in 1903	.082 ± .067
Petals and Stamens in 1904	.591 ± .016
Petals and Stamens in 1907	—.032 ± .025

The coefficients of correlation and their probable errors appear in Table B.

* Pearson, K. and others. Biometrika. **2**: 148. 1902.
† Yule, G. U. Biometrika. **1**: 307–309. 1901.
‡ Whitehead, H. Biometrika. **2**: 108–113. 1902.

From these values it appears that the number of sepals and the number of petals are very closely interdependent, all the coefficients falling above .700*. The values obtained by others for *Ficaria ranunculoides* show correlation ranging from .099 to .291 for sepals and petals. The correlations for sepals and stamens, and for petals and stamens agree in having the coefficients for 1903 and 1907 insignificant† while those for 1904 lie in the neighborhood of .500, and are clearly significant with regard to their probable errors. The correlations for *Ficaria* range from .023 to .223 for sepals and stamens, and from .224 to .382 for petals and stamens. I am rather surprised to find such low values representing the interdependence of the number of floral parts.

The foregoing remarks are presented primarily as a contribution of quantitative data on a species which has attracted the attention of a number of well-known botanists, first among whom was Darwin. General conclusions cannot be drawn from them, but the disagreement of the constants from the several series, coupled with the statement of taxonomists concerning the condition of the dimorphic stamens in different species, seems to indicate that there is a promising field for the attention of some one who can take up the investigation on material growing under more normal conditions. Some will say that the disagreements of these constants show that biometric methods are useless in their application to questions such as this. To my mind quite the reverse is true. They show that there are problems which can only be solved by the delicate technique of higher statistics. And, most important of all, perhaps they indicate the limits of trustworthiness of our conclusions.

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* The probable error of the first coefficient in the table is given as 0, but while this is the value given by the usual formula, too great biological significance must not be attached to it. A slightly larger collection of material might have given r less than 1, and the probable error would then have been rather high because of the smallness of N.

† I have not considered the form of the regression line in these tables. Possibly the correlation ratio would give a positive relationship between these characters, but I have not felt it worth while to calculate this constant on these series of material. What we need is more data!

TABLE I. 1903. SEPALS AND PETALS.

		Petals.			
		5	6	7	Totals.
Sepals	5	16	..	..	16
	6	..	79	..	79
	7	..	..	4	4
	Totals	16	79	4	99

TABLE II. 1903. SEPALS AND STAMENS.

(Petals and stamens show the same correlation.)

		Stamens.								
		0	1	2	3	4	5	6	7	Totals.
Sepals	5	..	..	2	2	5	6	1	..	1
	6	13	5	6	9	6	3	37	..	79
	7	..	..	..	..	..	..	1	3	4
	Totals	13	5	8	11	11	9	39	3	99

TABLE III. 1904. SEPALS AND PETALS.

		Petals.				
		5	6	7	8	Totals.
Sepals	5	15	39	..	..	54
	6	..	677	4	..	681
	7	..	1	25	..	26
	8	..	..	..	2	2
	Totals	15	717	29	2	763

TABLE IV. 1904. SEPALS AND STAMENS.

		Stamens.				
		4	5	6	7	Totals.
Sepals	5	..	10	44	..	54
	6	2	14	660	5	681
	7	..	..	7	19	26
	8	..	..	1	1	2
	Totals	2	24	712	25	763

T. V. 1904. PETALS AND STAMENS.

		Stamens.				
		4	5	6	7	Totals.
Petals	5	..	10	5	..	15
	6	2	14	697	4	717
	7	..	..	9	20	29
	8	..	..	1	1	2
	Totals	2	24	712	25	763

TABLE VI. 1907. SEPALS AND PETALS.

		Petals.				
		4	5	6	7	Totals.
Sepals	4	4	..	..	..	4
	5	6	161	3	..	170
	6	2	23	535	1	561
	Totals	12	184	538	1	735

TABLE VII. 1907. SEPALS AND STAMENS.

		Stamens.								
		0	1	2	3	4	5	6	7	Totals.
Sepals	4	..	..	1	..	2	1	..	..	4
	5	6	2	16	27	57	58	4	..	170
	6	84	56	57	54	47	62	200	1	561
	Totals	90	58	74	81	106	121	204	1	735

TABLE VIII. 1907. PETALS AND STAMENS.

		Stamens.								
		0	1	2	3	4	5	6	7	Totals.
Petals	4	1	..	2	1	5	3	..	..	12
	5	8	6	14	28	60	62	6	..	184
	6	81	51	58	52	41	56	198	1	538
	7	..	1	..	..	..	..	..	..	1
	Totals	90	58	74	81	106	121	204	1	735

THE CORRELATION BETWEEN LENGTH OF FLOWERING-STALK AND NUMBER OF FLOWERS PER INFLORESCENCE IN NOTHOSCORDUM AND ALLIUM.

BY J. ARTHUR HARRIS.

Several years ago DeVries in outlining some of the problems of chief importance for future investigation in evolutionary work, designated correlation as one of the most important.* In another place in the same volume he discusses data of his own for the relationship between the diameter of the stem and the length of the fruit in certain of his evening primroses.†

Notwithstanding DeVries's emphasis of the importance of quantitative studies of correlation, comparatively little has been done by botanists. His suggestion concerning a relationship between the size of the individual and the measurable characters of the fruit called my attention to the desirability of a series of comparative studies of the interrelationship between the vegetative development of organs of the individual and the number or fertility of the flowers or fruits which it produces.

As material for a first determination of the interdependence of length of flowering-stalk and number of flowers per inflorescence I shall use series of *Nothoscordum* and *Allium*. Data from the inflorescences of several other species are being examined.

In the spring of 1906, a collection of the flowering-stalks of *Nothoscordum striatum* was made just south of the railway station at Meramec Highlands, near St. Louis, Mo. Here the brow of the hill slopes in two directions, to the southeast and to the southwest. The ground was more or less covered with old dead or leafless vegetation consisting chiefly of sumach bushes, large tufts of grass and weeds, and low grass. While no quantitative determination was made, it seemed to me that the old vegetation on the southwest slope was much

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* DeVries, H. Die Mutationstheorie. **1**: 113. 1901.

† DeVries, *l. c.* 381–383.

more diversified from quadrat to quadrat in size and quantity than that upon the southeast slope. These remarks apply merely to the localities from which the samples of material were taken.

It occurred to me that a consequence of this condition might be a greater variability of the length of the stem in the series from the southwest slope. Here some of the plants grew up through large tufts of grass or dead weeds, while others occurred in open spots. Some were close to shrubs of considerable size and others grew where the vegetation was much smaller. On the southeast slope, on the other hand, the grass was rather uniformly short and weeds and bushes very few. If variability in the individuals of a population be to a considerable extent due to diversity in their edaphic environment, as many writers have suggested, it would seem quite reasonable to expect a greater variability on the southwest slope where conditions were apparently more diverse than on the southeast slope.

TABLE I. NOTHOSCORDUM.

Length of Stalk in Centimeters.

Flowers per Umbel	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	Totals
3	..	..	1	..	..	..	..	1	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3
4	..	1	1	3	4	2	11	6	3	1	3	2	1	2	..	1	..	..	1	..	..	..	..	..	..	..	42
5	2	..	3	2	2	10	11	11	6	15	8	4	2	3	6	1	..	..	3	..	..	..	..	..	..	..	89
6	..	1	..	1	1	8	2	7	8	10	8	10	9	7	3	3	2	1	..	1	..	..	..	..	..	..	82
7	..	..	1	1	1	2	3	2	2	7	6	11	9	8	13	4	3	..	2	1	1	1	..	..	1	..	79
8	..	..	..	..	..	..	..	..	..	2	5	2	2	..	6	3	..	2	1	2	..	..	..	4	..	..	29
9	..	..	..	..	1	1	1	1	..	1	..	..	4	4	2	1	2	1	1	2	2	..	..	..	..	..	24
10	..	..	..	..	..	..	..	..	..	..	..	1	..	..	1	..	..	2	..	..	..	2	..	..	..	..	6
11	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	1	..	..	1	1	..	..	..	..	1	5
Totals	2	2	6	7	9	23	28	28	19	36	30	31	27	25	31	13	8	6	8	7	4	3	..	4	1	1	359

CORRELATION IN FIRST COLLECTION, SOUTHWEST SLOPE.

For the purpose of ascertaining whether the plants from these two spots, distant only a few yards from each other, do show differences in variability and correlation the material was collected in separate lots. That from the southwest slope comprised 359 flowering-stalks and the correlation be-

tween length of stalk and number of flowers per inflorescence is shown in Table I, while that from the southeast slope numbered 426 plants whose characteristics are shown in Table II.

TABLE II. NOTHOSCORDUM.

	Length of Stalk in Centimeters.																				
		10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	Totals
Flowers per Umbel	3	1	2	3	2	4	2	2	2	1	..	..	..	..	..	..	..	..	..	..	..	19
	4	..	1	6	3	10	15	7	11	9	1	5	1	3	1	..	..	..	..	1	..	74
	5	1	2	3	8	8	21	22	22	22	16	11	9	6	5	2	1	..	..	..	..	159
	6	..	1	1	2	3	4	7	6	9	12	13	6	7	1	2	1	3	1	2	1	82
	7	..	1	2	..	2	1	5	6	10	7	6	8	10	8	3	..	3	..	..	..	72
	8	..	..	..	..	..	..	..	..	1	3	3	3	1	..	1	1	..	..	1	..	14
	9	..	..	..	..	..	..	..	..	1	..	..	..	1	1	..	2	1	..	..	..	6
	Totals	2	7	15	15	27	43	43	47	53	39	38	27	28	16	8	5	7	1	4	1	426

CORRELATION IN SECOND COLLECTION, SOUTHEAST SLOPE.

In these tables the numbers in the left marginal column represent flowers per inflorescence while those along the top give the length of stalk to the nearest centimeter.

A word must be said concerning the method of collecting the samples. To dig out the bulbs for so many individuals would have been an almost impossible task. By pulling steadily and gently on the stalk it breaks a considerable distance under ground and at about the same point near the bulb. It is fairly easy to detect stalks which have broken sensibly above the usual point and such were discarded. This method of gathering the stalks is a source of some error. The means are necessarily slightly reduced below what they would have been could the bulbs have been dug out. Possibly, too, the variabilities are slightly increased. But the purpose of this first investigation was merely to get some general idea of the degree of interdependence of length of peduncle and number of flowers per inflorescence, and for this purpose very precise measurements are superfluous. I think the error introduced by the method of collecting the plants is—for the purposes in hand—so slight that it may be neglected. At the time the material was gathered prac-

tically all the flowers had opened or were nearly ready for anthesis. All those with young buds were discarded to avoid the possibility of including stalks which had not completed their growth. These were very few in number and the samples taken may be regarded as representative of the species in this habitat. The rather coarse scale of centimeter units was adopted partly because of the possible error in the collecting of the material referred to above and partly to obviate the apparently needless labor of dealing with much larger correlation tables.

TABLE A. NOTHOSCORDUM.

Organ and Source of Material	Average and Probable Error	Standard Deviation and Probable Error	Coefficient of Variation
Length of Stalk			
Southwest Slope	19.407±.162	4.545±.114	23.421
Southeast Slope	17.970±.115	3.511±.081	19.541
Difference	+1.437±.198	+1.034±.140	+3.880
Flowers per Inflorescence			
Southwest Slope	6.212±.056	1.584±.040	25.505
Southeast Slope	5.423±.039	1.217±.028	22.435
Difference	+.789±.068	+.367±.049	+3.070

VARIATION CONSTANTS.

The means, standard deviations and coefficients of variation, and the probable errors of the first two constants, are given for length of stalk and number of flowers per inflorescence in Table A. Sheppard's correction for the second moment was used for all the variabilities given in this paper.

These constants require little discussion in this place. The means, standard deviations and coefficients of variation are all somewhat higher, and as the probable errors of the differences show significantly higher, in the series from the southwest slope than in the other of the two lots. The empirical range is also wider, although N is smaller, in the collection from the southwest slope, where I had estimated that edaphic conditions were more variable than in that from the southeast slope where they had appeared to me more uniform.

But before any great stress is laid upon these results some real measure of the relative variability of the environmental conditions in different habitats should be secured. Until better data can be obtained these differences in the constants for two collections of material in habitats a stone's throw from each other may serve as a further warning against the collection of biometric material without due regard to environmental conditions.*

The coefficients of correlation are the constants which give the direct answer to the chief question in hand. They are:—

Plants from southwest slope, $r = .549 \pm .025$
Plants from southeast slope, $r = .490 \pm .025$
Difference ..... $.059 \pm .035$

These constants show at once that there is a very substantial interdependence between the length of the flowering-stalk and the number of flowers per inflorescence. The two constants appear somewhat unlike to the eye, but when the probable error of their difference is taken into account it is clear that their divergence is not significant.

To render the relationship between the length of the stem and the number of flowers per inflorescence more clear to those unacquainted with biometric terminology we may express the relationship in terms of regression instead of correlation. The equations to the regression straight lines are:—

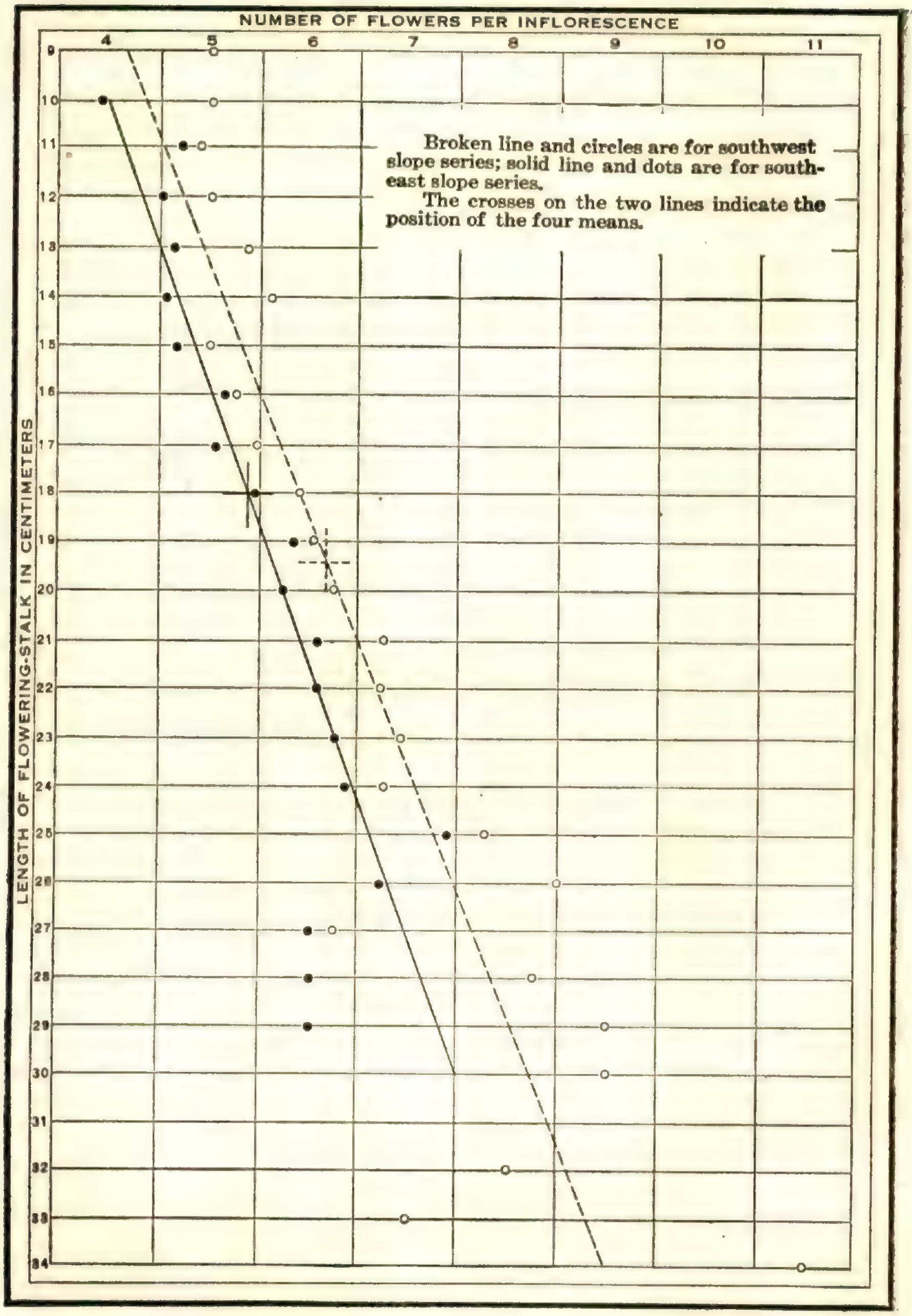
For the series from the southwest slope,
$$y = 2.501 + .191\,x.$$
For the series from the southeast slope,
$$y = 2.375 + .170\,x.$$

Here x denotes length of stalk and y number of flowers. From these regression coefficients we see that an increase of about two-tenths of a flower per inflorescence is on an average associated with an increase of a centimeter in the length of the stalk.

The relationship between the length of the stalk and the number of flowers per inflorescence may be represented graphically by the slope of the regression line, as in Diagram I.

* For one of the first discussions of this subject see the papers on the sources of apparent polymorphism in plants in Biometrika. **1**: 304–319. 1902.

DIAGRAM I. NOTHOSCORDUM.



SLOPE OF REGRESSION STRAIGHT LINES IN TWO COLLECTIONS.

The solid dots and the circles show the actually observed mean numbers of flowers per inflorescence for the several grades of stem length in the two series. The agreement between observation and theory is not very close, but N is not very large in either series and consequently the means of some of the arrays are based upon an inadequate number of observations. While the observed means do not fall so near the theoretical lines as one might like to see them, it seems quite idle to seek for a better equation than that for the straight line. Regression seems to be, so far as we can judge from the present data, linear.

The material for *Allium stellatum* was taken in the fall of 1907 from the hills at Meramec Highlands, Mo. The plants were not collected from such restricted habitats as those of *Nothoscordum*, but were drawn from a considerable range of territory, perhaps four square miles altogether. The method of gathering and measuring the stalks was the same as for *Nothoscordum*. In this case the range of variation is so wide that it is convenient to group in classes of three units for purposes of calculation. The data are presented in Table III; the calculated variation constants, in Table B. The coefficient of correlation between length of stalk and number of flowers per inflorescence is $.619 \pm .018$. Here again the variation constants require no particular comment and are given merely for the convenience of the reader. The coefficient of correlation is slightly higher than that for *Nothoscordum*, but whether any significance is to be attached to the difference could only be determined by the collection of further series of material.

The equation to the regression straight line is

$$y = -15.480 + 1.311\,x,$$

where x = length of stalk and y = number of flowers per inflorescence. The graph, Diagram II, shows that the empirical means fall very close to the theoretical line for all but the last three classes. Here there appears at first to be some indication of non-linear regression, but a glance at the correlation table shows that the means are based on only 4, 3, and 1 observations respectively and hence cannot be given

much weight. Under these circumstances I would rather devote time to the collection of additional data than to the mathematical analysis of those already on hand. Hence no further tests for linearity of regression are applied.

TABLE III. ALLIUM.

Number of Flowers per Inflorescence.

Length of Stalk in Centimeters	8–10	11–13	14–16	17–19	20–22	23–25	26–28	29–31	32–34	35–37	38–40	41–43	44–46	47–49	50–52	53–55	56–58	59–61	62–64	65–67	68–70	71–73	74–76	77–79	80–82	83–85	86–88	89–91	92–94	96–98	99–101	102–104	105–107	108–110	
26–28	1	..	1	1	..	1	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5
29–31	..	..	2	5	2	2	1	3	2	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	19
32–34	2	..	4	2	6	15	10	9	9	5	8	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	73
35–37	..	..	..	4	7	8	14	21	15	16	4	5	5	1	3	2	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	106
38 40	..	1	..	2	3	9	13	11	16	14	23	10	5	4	6	1	..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	120
41–43	..	..	..	..	..	3	3	7	11	17	10	9	10	2	4	3	..	1	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	82
44–46	..	..	..	..	2	1	1	2	9	8	7	10	6	4	4	4	1	3	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	64
47–49	..	..	..	..	..	1	..	2	1	1	3	1	8	8	2	1	2	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	32
50–52	..	..	..	..	..	..	..	..	2	..	..	2	2	1	2	1	3	..	..	1	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	16
53–55	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	4
56–58	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	3
59–61	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
	3	1	7	14	20	40	42	55	65	61	57	40	37	21	23	13	6	8	1	4	2	1	1	..	1	..	1	..	..	..	..	..	..	1	525

CORRELATION.

TABLB B. ALLIUM.

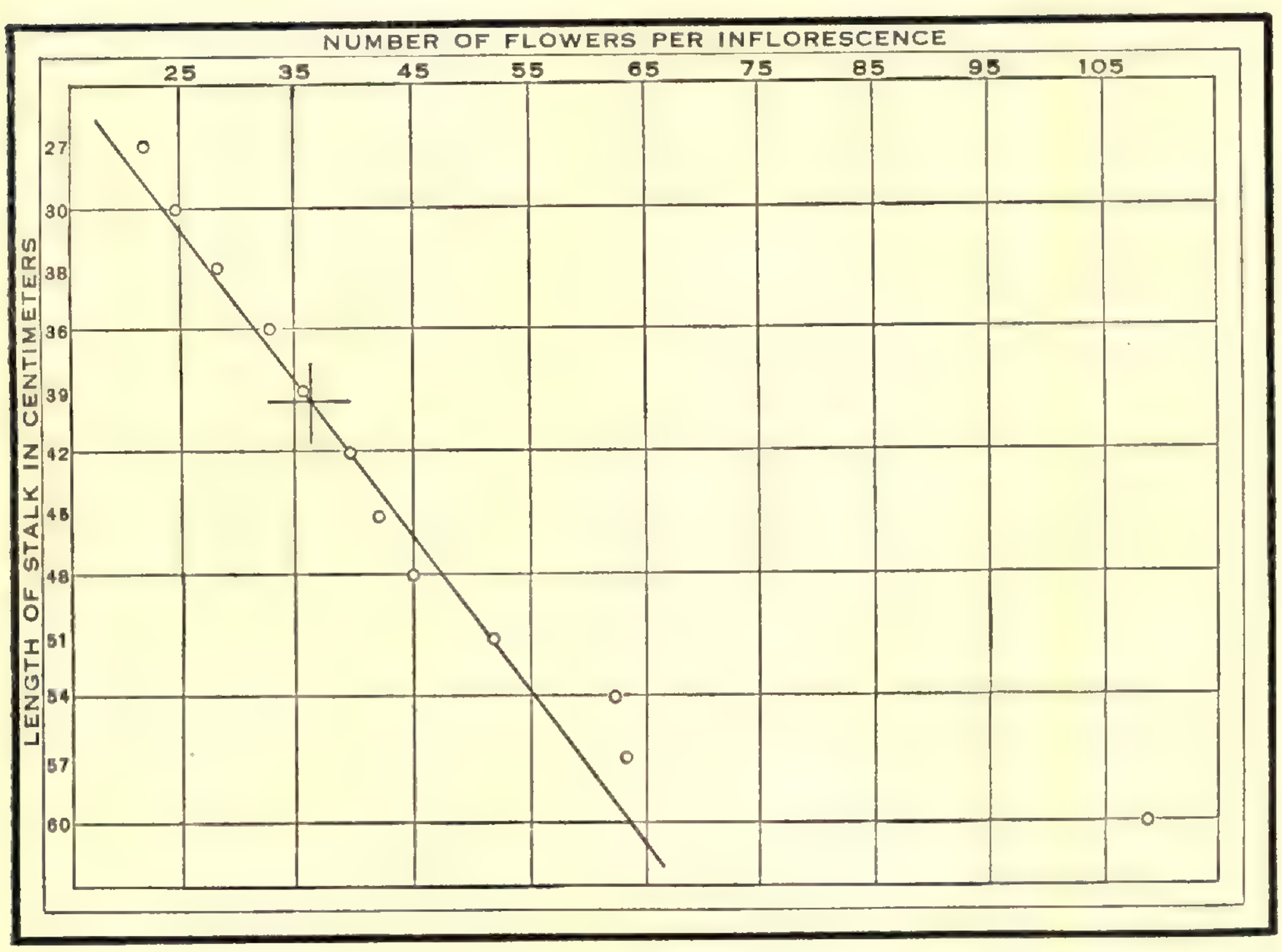
	Length of Stalk	Number of Flowers per Inflorescence
Average and Probable Error	39.491±.160	36.309±.340
Standard Deviation and Probable Error	5.446±.118	11.571±.249
Coefficient of Variation	13.791	31.785

VARIATION CONSTANTS.

In both of these cases the regression seems to be linear, although in *Nothoscordum* the fit of the means to the theoretical line is not very good, and in the case of *Allium* there is some question concerning the upper part of the range, where the observations are inadequate. Further tests of linearity might be applied, but it seems hardly worth while to do so at the present time.

The significance of linear regression in the present cases is two-fold. First, it shows that we are quite justified in using the coefficient of correlation to describe the degree of interdependence of length of flowering stem and number of flowers per inflorescence. Second, it shows our material to be in

DIAGRAM II. ALLIUM.



SLOPE OF REGRESSION STRAIGHT LINE.

this respect in agreement with the vast majority of organic relationships, for in most cases of organic correlation regression is sensibly linear.

In short the high positive values of r and the apparently linear regressions indicate that in this material the length of the stalk and the number of flowers per umbel are intimately associated and that the rate of change in the number of flowers as we pass from the shortest to the longest stalks remains practically the same throughout the entire range of variation of the latter character.

There are sources of danger in interpreting these coefficients of correlation biologically. We are dealing here with statistical constants which measure precisely the degree of similarity of the associated variables under consideration, but give no intimation whatever as to the cause of this similarity. The physiologist has long used the term correlation, and it must be borne in mind that the word has a somewhat different meaning in the terminology of quantitative biology. All that the coefficient of correlation does is to *describe*, not *interpret*, degrees of interdependence. In the present instance we are dealing with perennial plants, and it is not at all unreasonable to think that the age of the individuals may make considerable difference in the magnitude of both the length of the flowering-stalk and the number of flowers per inflorescence. In this case the correlation would be increased by an amount depending upon the age heterogeneity of the collections. There seems to be, however, no way of avoiding this difficulty in material of this kind gathered in nature. Comparison with plants of annual habit of growth might, perhaps, throw some light upon this question.

In conclusion, the data presented show that there is a considerable degree of interdependence between the length of the flowering-stalk of these monocotyledons and the number of flowers which they produce. It is not at all surprising to find this relationship, and refined statistical methods would not have been required to demonstrate its existence in this particular case. To those who urge that it is pedantic to devote laborious researches to the demonstration of what is to be *a priori* expected, the reply is two-fold. First, in science, assumptions, however plausible on the surface, should never be accepted without actual demonstration on adequate material. The need of careful regard to this dictum is found in the group of problems we are considering here. In unpublished data somewhat similar to these, for other species, I find results not at all in agreement with those set forth in the present paper, although there is *a priori* quite as much reason for expecting high positive correlations as in the species here considered. Second, we should not be content to merely demonstrate the existence of a relationship; we

should measure its intensity as well. When a sufficient number of such measurements are available, comparisons will permit broader generalizations and suggest deeper researches than we can now foresee, or can ever hope to attain without strictly quantitative methods of investigation.

CORRELATION IN THE INFLORESCENCE OF CELASTRUS SCANDENS.

BY J. ARTHUR HARRIS.

Data supplementary to those presented in the preceding papers are to be found in my notes on the inflorescence of *Celastrus scandens*. Since I have not now the time for collecting sufficiently numerous and varied series of material for a comprehensive study of variation and correlation in the inflorescence it seems best to publish the rather diverse notes which I have under separate titles which shall indicate the species examined as well as the subject considered.

In the fall of 1905, 386 clusters of the fruit of *C. scandens* were collected in the woods a little north of Jefferson Barracks, Mo. All of these were taken from one clump of vines. Whether these were parts of the same individual or whether more than one plant was involved was not definitely determined at the time. The fruits were gathered primarily to secure a variation curve for number of seeds developing per fruit, and the problems connected with the inflorescence presented themselves later. At that time, too, like most biologists I was unacquainted with the importance of knowing definitely the number of individuals from which material for quantitative investigation is taken. Presumably only a single plant was involved, but we do not *know* this to be true. And so far as I am able to see this unfortunate omission in our observations does not affect in any way the validity of any conclusions drawn in this paper, although it has necessitated the neglecting of certain other points which might have been considered had our knowledge of this point been definite.

These fruits are very easily worked with. A transverse section quickly made with a razor, shows at a glance the number of seeds which have developed. The normal number of cells in this collection of material was three, and two seeds sometimes developed in each locule. The maximum normal number of seeds was assumed to be six. In sectioning

2541 fruits, only two were found in which the fruit was four-celled and the number of seeds greater than 6. Of course it is impossible to say that more than 6 ovules might not have been produced in any of the fruits which bore 6 seeds or fewer. It seemed best to regard these two cases merely as teratological; the two clusters upon which they were borne were therefore discarded, and only 384

TABLE I. CELASTRUS.

Flowers per Inflorescence	Fruits Matured per Inflorescence.																						
		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Totals
4		..	2	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5
5		..	1	2	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4
6		..	3	1	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	6
7		1	5	4	..	2	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	13
8		1	11	5	6	..	..	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	27
9		1	9	6	11	3	2	5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	37
10		1	5	9	3	9	3	3	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	36
11		..	5	4	10	5	8	1	1	2	1	..	..	..	..	..	..	..	..	..	..	..	..	37
12		..	7	8	5	9	9	3	6	4	1	2	..	..	..	..	..	..	..	..	..	..	..	54
13		..	4	6	4	6	6	6	2	4	3	1	1	..	..	..	..	..	..	..	..	..	..	43
14		1	1	6	3	2	5	2	5	3	2	4	2	2	..	..	..	..	..	..	..	..	..	38
15		..	1	4	4	2	3	3	5	5	4	2	..	2	1	..	..	..	..	..	..	..	..	36
16		..	1	2	5	2	1	3	2	..	2	1	4	..	..	..	..	..	..	..	..	..	..	23
17		..	1	..	1	..	3	3	1	1	..	1	..	1	1	..	..	..	..	..	..	..	..	13
18		..	..	..	..	..	..	1	1	..	..	..	..	1	..	1	..	..	..	..	..	..	..	4
19		..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
20		..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	..	2	..	..	..	..	..	4
21		..	..	..	1	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	2
22		..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.....
23		..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.....
24		..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
Totals		5	56	60	55	42	41	34	24	21	14	11	7	6	4	1	..	2	..	..	..	..	1	384

CORRELATION FOR FLOWERS AND FRUITS.

used for the statistical study. Since that time I have found *Celastrus* in which 4-celled fruits occurred very frequently, and it is possibly unfortunate that the two inflorescences bearing these aberrant fruits were discarded. But it is certainly not worth while to go to the labor of inserting them into the tables.

The number of fruits per inflorescence is quite variable, ranging in the present sample from 2 to 23. The first

question which arises is that concerning the relationship between the number of flowers formed and the number of fruits maturing per inflorescence. Unfortunately it is not possible to determine with absolute certainty the number of flowers formed from an examination of the mature fruit clusters. But from the scars left by the falling of the flowers failing to develop mature fruits it is possible to obtain a pretty close approximation, and I venture to publish the data after warning the reader that the frequencies are perhaps not absolutely trustworthy, though the best we could determine under the circumstances.

Table I shows the correlation between the number of flowers formed and the number of fruits maturing on the 384 inflorescences of our sample. The constants which are of service are:

Mean number of flowers	11.948±.110
Standard deviation of flowers	3.202±.078
Coefficient of variation of flowers	26.80
Mean number of fruits	6.578±.110
Standard deviation of fruits	3.196±.078
Coefficient of variation of fruits	48.58

The coefficient of correlation between the number of flowers formed and the number of fruits developing is

$$r = .572 \pm .023.$$

The degree of interdependence between these two characters is therefore very considerable. But isolated constants of this kind are of little interest; to give them the greatest significance a sufficient number of such correlations should be worked out to make the problem a comparative one. It will be of considerable physiological interest, I imagine, to determine how closely the number of fruits developing per inflorescence in distinct species, or in series of the same species taken in different habitats, is dependent upon the number of flowers formed. The only case available for comparison is that of the immature inflorescence of *Staphylea* * where we find a correlation of about 0.46. With a beginning once made, data of this kind will gradually accumulate.

* Harris, J. A. Biometrika. **6**: 441. 1909.

For present purposes the constant of most significance is not that for the relationship between the number of flowers formed and the actual number of fruits developing per inflorescence, but between the number of flowers formed per inflorescence and the deviation of the number of fruits developing per inflorescence from the number which would have developed had the number of fruits per inflorescence been merely proportional to the number of flowers formed in a ratio determined by the total number of flowers and fruits in the population as a whole. This constant shows us at once whether there is on the whole any difference in the capacity of the inflorescences for developing their ovaries into fruits depending upon the number of flowers of which they are composed. When I pointed out the desirability of such a constant as this to Professor Pearson while working in his laboratory he kindly worked out the mathematical formulae necessary.

The constant* is calculated from the formula

$$r_{xz} = \frac{r_{xy} - V_x/V_y}{\sqrt{1 - r_{xy}^2 + (r_{xy} - V_x/V_y)}},$$

where x = flowers and y = fruits per inflorescence, V_x and V_y are the coefficients of variation of the two characters, and z is to be read as "the deviation of the number of fruits per inflorescence from its probable value."

Substituting constants in the above formula we find

$$r_{xz} = .024 \pm .034$$

This constant, differing from 0 by less than its probable error, shows at once that there is no sensible difference in the capacity of inflorescences with different numbers of flowers to mature their fruits. The results are not at all in accord with those for the only other inflorescence so far investigated with regard to this point, the *Staphylea* series above referred to. There we found a considerable positive correlation between the actual number of flowers formed and fruits maturing, but a marked negative correlation of about —.65 between the number of flowers per inflorescence and the devia-

* Harris, J. A. Biometrika. **6**: 439. 1909.

tion of the number of fruits formed from their probable value. But it will be recalled that in the case of *Staphylea* the process of elimination of ovaries was not yet complete. In the original paper I remarked: "It may be found later that after the elimination is complete the correlation between the number of flowers and the deviation of the number of fruits per inflorescence from their probable number will rise to sensibly 0, or take a substantial positive value." I am anxious to see many other series of comparable material collected and reduced for comparison with these.

TABLE II. CELASTRUS.

Number of Flowers per Inflorescence	Number of Seeds per Fruit.							
		1	2	3	4	5	6	Totals
	4	5	7	4	.....	1	1	18
	5	.....	2	4	1	7	2	16
	6	1	7	7	6	1	2	24
	7	3	8	5	14	12	10	52
	8	4	17	11	36	33	16	117
	9	5	20	32	56	44	23	180
	10	4	22	38	52	57	23	196
	11	4	16	42	60	62	31	215
	12	4	34	71	94	97	48	348
	13	6	31	63	81	68	49	298
	14	7	23	68	77	81	50	306
	15	7	26	66	87	66	50	302
	16	3	12	34	52	50	32	183
	17	2	9	22	32	28	20	113
	18	.....	5	13	20	6	3	47
	19	.....	.....	1	1	3	1	6
	20	3	6	13	16	16	8	62
	21	.....	1	9	3	6	1	20
	22	.....	.....	.....	.....	.....	.....	.....
	23	.....	.....	.....	.....	.....	.....	.....
	24	2	1	8	7	4	1	23
	Totals	60	247	511	695	642	371	2526

CORRELATION FOR FLOWERS PER INFLORESCENCE AND SEEDS PER FRUIT.

The second question to demand solution is; What relationship, if any, is there between the number of flowers formed per inflorescence and the number of seeds in the fruits of an inflorescence? The same question is to be asked

concerning the relationship between number of fruits maturing per inflorescence and number of seeds maturing per fruit.

If the inflorescences with larger numbers of flowers or fruits represent the more vigorous fruiting axes, it seems not unreasonable to suppose that they might mature more seeds per fruit than the smaller axes. No originality is claimed for this suggestion. The idea seems to be held in one form or

TABLE III. CELASTRUS.

Number of Fruits per Inflorescence	Number of Seeds per Fruit. 1	2	3	4	5	6	Totals
2	.....	1	.....	3	2	4	10
3	6	24	32	48	37	21	168
4	7	27	54	59	49	44	240
5	3	32	54	82	78	26	275
6	6	30	55	57	64	40	252
7	5	31	42	90	76	43	287
8	6	21	43	81	77	44	272
9	.....	13	45	62	54	42	216
10	8	19	49	56	57	21	210
11	8	20	37	33	35	21	154
12	.....	7	29	31	40	25	132
13	2	3	10	25	31	20	91
14	1	6	21	28	17	11	84
15	3	3	16	19	14	5	60
16	.....	3	7	6	.....	.....	16
17	.....	.....	.....	.....	.....	.....	.....
18	3	6	9	8	7	3	36
19	.....	.....	.....	.....	.....	.....	.....
20	.....	.....	.....	.....	.....	.....	.....
21	.....	.....	.....	.....	.....	.....	.....
22	.....	.....	.....	.....	.....	.....	.....
23	2	1	8	7	4	1	23
Totals	60	247	511	695	642	371	2526

CORRELATION FOR FRUITS PER INFLORESCENCE AND SEEDS PER FRUIT.

another by a number of botanists with whom I have talked. Some even seem to consider that it is so self-evident that there should be a correlation between the size of the individual—in the case of annual plants—and the fertility of its fruits, or between the size of the inflorescence and the fertility of the fruits that it is hardly worth while to take up an actual investigation of the problem.

Tables for the correlation between the number of flowers per inflorescence and the number of seeds per fruit, and for the number of fruits developed per inflorescence and the number of seeds per fruit, are given under the numbers II and III. The possibility of some uncertainty concerning the number of flowers formed will be borne in mind.

In these tables the numbers of flowers formed and fruits developing are necessarily weighted with the number of fruits which they actually produce. In calculating the correlation coefficients, standard deviations based on these weighted frequencies were calculated, but it seems unnecessary to publish them here. The constants for number of seeds per fruit are:

Mean	$4.0788 \pm .0172$
Standard deviation	$1.2817 \pm .0122$
Coefficient of variation	31.422

The relationship between number of flowers per inflorescence and number of seeds per fruit, and between number of fruits developing per inflorescence and the number of seeds per fruit are:

Number of flowers and number of seeds, $r = .033 \pm .013$

Number of fruits and number of seeds, $r = -.012 \pm .013$

Possibly the first of these coefficients is significant with regard to its probable error; the second is certainly not. In the calculation of these probable errors, N was taken as the actual number of fruits involved in the correlation table. If we consider that the degree of trustworthiness of our work is determined rather by the number of inflorescences, our probable errors will be so raised that neither of these constants can possibly be regarded as significant. The fact that one is positive and the other negative also raises some doubt as to their significance.

We conclude therefore that, so far as the data now available for this species enable us to determine, there is neither sensible interdependence between the number of flowers formed on an inflorescence and its capacity for maturing the ovaries of these flowers into fruits nor sensible relationship between the size of an inflorescence as measured by the number of flowers it produces and the number of seeds per fruit.

AN ANALYTICAL KEY TO SOME OF THE SEGREGATES OF OENOTHERA.

BY REGINALD R. GATES.

This little key is published with the idea of aiding botanists in America and Europe, who have no special knowledge of or acquaintance with the forms concerned, in identifying some of the recent segregates and mutants of *Oenothera* as they are now recognized on the basis of the pedigree cultures of recent years. Since some of these forms, such as *O. grandiflora*, are known still to occur in the wild condition, and since some of them are liable to be discovered at any time in a new locality, it is important that botanists in general should have available a brief analytical key with mention of the chief differentiating characters and references to some of the best illustrations and descriptions of the various forms.

As an instance of the necessity for this may be mentioned a recent experience of the writer, whose attention was called to a large flowered evening primrose growing in the back yard of a citizen of Saint Louis, Mr. Ernest F. Aehle, 5143 Page Avenue. The large flowers attracted attention and a specimen was brought for identification. An examination of the plant showed that it is very probably a form or derivative of *O. grandiflora*. This plant is at present only known from two localities in Alabama, and the source from which this particular specimen reached its present location is quite unknown. But it is by no means unlikely that search by botanists and collectors will reveal its presence in various parts of the country. Probably the most likely location in which to look for *O. grandiflora* is in the States of the Middle South. I may say that cultures of some English Oenotheras growing wild near Liverpool, an account of which is as yet unpublished,* show that various races of *O. grandiflora*, as well as *O. Lamarckiana* and its derivatives, occur in that locality.

* See Proceedings British Assoc. Adv. Sci., Sec. K. Winnipeg meeting, 1909.

It is hoped that this key will aid botanists in the identification, approximately at least, of these forms, and will lead to an increased interest among collectors in the search for these types throughout North America and Europe. Of course the present key is very incomplete and it would be desirable to add many forms to the list, but these can be added as our knowledge of the forms becomes more accurate through the medium of pedigree cultures.

Even though the forms which will be discovered are found to have been introduced or escaped from gardens, a comparison of the types from various stations as they occur under such conditions is of interest, as I have already found from my cultures of the Liverpool Oenotheras. The study and comparison of such areas will lead to results of the greatest interest and importance bearing on such problems as the effects of climatic conditions after long periods. The Oenotheras, on account of their weed-like character, are of peculiar value from this standpoint, because their habit of preempting deserted areas and multiplying rapidly makes each such patch or locality equivalent to a transplantation experiment in which the success or failure of the various mutants and segregates, and the changes they have undergone under the conditions of the struggle, can be noted and analyzed.

It is a good example of the occasional vagaries of systematic botany that *O. grandiflora* should have been so long considered a mere "large-flowered variety" of *O. biennis*, while in reality it is at least as distinct from *O. biennis* as is *O. Lamarckiana*. Though *O. grandiflora* and *O. Lamarckiana* come in the same sub-group of the Onagra series, they are distinct from each other in a great many characters, and both appear undoubtedly to be good "Linnean" species. What the relation of such large-flowered forms as *O. Hookeri* and *O. Drummondii* is to *O. biennis* and *O. grandiflora*, I am not at present prepared to indicate. The difference between the small-flowered forms, with short style, such as *O. biennis*, and the large flowered forms with long style, such as *O. grandiflora*, is probably the most distinct line of cleavage in the sub-genus Onagra.

The following key is prepared largely from the characters of the plants as they have appeared in my own cultures. The only exceptions are *O. argillicola,* the account of which is taken from MacDougal, Carnegie Pub. 24: 11. *pl.* 7. 1905, and Mackenzie, Notes on evening primroses, (Torreya, **4**: 56–57), 1904; *O. Simsiana, O. Oakesiana, O. muricata* and *O. parviflora,* the account of which is from Vail, Carnegie Pub. 81. 1907; and *O. elliptica, O. sublinearis,* and *O. scintillans,* which I have not grown, and for which the description has been taken from DeVries' account. DeVries, in his Mutationstheorie, **2**: 322–328, has already prepared several keys to the mutants, based respectively on seedling characters; height and branching of plants; leaves; and flowers, fruits and seeds. In the following key, characters are chosen from all the stages of development, and, as far as possible, from those which are most likely to be encountered by a botanist in the field. The selection of differentiating characters under these circumstances is a difficult one and I am not sure that the choice I have made is always the best. But short descriptions, enumerating the chief distinctive features of the various forms, are appended for aid in case the stages chosen in the keys are not available, or the distinctions drawn are not sufficiently clear. References are also given to some of the most accurate figures of the different species.

It should be said that in the case of the mutants from *O. Lamarckiana,* occasional specimens appear which transgress in one or more characters any line which can be drawn between related forms. Usually, however, the forms fit very well the descriptions given them.

There is no attempt to cite the extensive literature of the genus here. A systematic treatment was published by Small* in 1896, and a monograph by Léveillé† in 1902 and 1905.

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* Small, John K. Oenothera and its segregates. (Bull. Torr. Bot. Club. **23**: 167–194). 1896.

† Léveillé, H. Monographie du genre Onothera. Le Mans. 1902 and 1905.

GENERAL KEY.

Petals cruciate, narrow and linear. *O. cruciata.*

This probably includes a number of sub-forms. Cruciate varieties of *O. Lamarckiana* and of European *O. biennis*, as well as of other forms, are also known. See DeVries, Die Mutationstheorie. **2**: 593–633.

Petals broad; flowers small, about 3 cm. in diameter; petals about 13–15 mm. long; style short, so that the anthers surround the stigma lobes and ensure self-pollination in the bud.

Sepal tips appressed; capsule not taper, often stouter near the middle. *O. biennis* and its segregates.

Sepal tips spreading; capsule long and taper. *O. Oakesiana.*

Petals broad; flowers smaller than in *O. biennis;* stigma situated below the anthers in the bud.

Petals 13–15 mm. long; rosette persisting when the plant is mature. *O. muricata.*

Flowers larger than in *O. muricata;* rosette persisting. *O. ammophila.*

Flowers very small; petals 8 mm. long; rosette not persisting. *O. parviflora.*

Petals broad; flowers large; style long (except in *O. brevistylis*, which has a very short style), protruding the stigma beyond the stamens and preventing self-pollination before the bud opens.

Flowers large, about 7 cm. or more in diameter; style very long, so that the stigma protrudes from the bud before the latter opens (as is often true also of the buds of *O. Lamarckiana* and *O. grandiflora* in the latter part of the season); calyx glabrous. Rosette leaves nearly glabrous, long, linear or linear-spatulate, sinuate. *O. argillicola.*

Flowers about 7 cm. in diameter; style short, so that the stigma is surrounded by the anthers, as in *O. biennis. O. Simsiana.*

Flowers about 7 cm. in diameter (or larger in *O. gigas*); style longer than in *O. biennis*, so that the stigma is protruded beyond the stamens, but enclosed in the bud, except in some cases in the later and smaller buds of the season.

Buds smooth, with an inconspicuous pubescence of short hairs; sepals thin and papery; bud-cone slender, about 6 to 7 mm. in diameter at the base, and rounded owing to thinness of sepals and less prominence of the median longitudinal ridge of the sepals; sepal tips usually long and very slender. Red glands on stem present or absent. *O. grandiflora* and its segregates.

Buds papillate, with numerous long and short hairs; sepals somewhat thicker than in *O. grandiflora* and median ridge more prominent, giving a characteristic squarish appearance to

the buds; sepal tips awl-shaped, stouter than in *O. grandiflora*. Red glands always present on stems.

O. Lamarckiana and its segregates.

KEY TO THE LAMARCKIANA FORMS.

Rosette leaves, and to a lesser extent in some cases, stem leaves crinkled..a
Rosette and stem leaves nearly or quite free from crinkling .....b

a. Rosette leaves and stem leaves sessile or nearly so. *O. nanella.*
Rosette leaves and lower stem leaves with petioles.....c

c. Petioles of rosette leaves not margined. *O. oblonga.*
Petioles of rosette leaves margined.....d

d. Leaves whitish.....e
Leaves green without whitish cast. .....f

f. Flowers larger than in *O. Lamarckiana*; bud cone about 9 to 10 mm. in diameter at the base; hypanthium stouter, about 4 mm. in diameter. *O. gigas.*

Flowers somewhat smaller; bud cone about 7 to 8 mm. in diameter at the base; hypanthium more slender, about 3 mm. in diameter....g

g. Rosette leaves oblong or fairly broadly lanceolate, crinkled, pointed..... .....h
Rosette leaves very broad, oblong, with very obtuse tips, lighter green and much crinkled i
Rosette leaves similar to those of *O. Lamarckiana* (h), but rather broader and with very obtuse, rounded tips. The bracts are also broader than in *O. Lamarckiana*, and the sepal tips very short. *O. brevistylis.*

h. Blooming at the same time in the season as other forms (in my cultures beginning about the end of July). Ovaries of ordinary shape, 8 to 10 mm. in length.—See short description. *O. Lamarckiana.*
Blooming later than *O. Lamarckiana* (beginning in my cultures of this year about August 15th). Leaves like those of *O. Lamarckiana*, but closely clothing the stem; branches few; capsules long and thin. *O. leptocarpa.*

i. Stems often weak and more or less decumbent; buds greenish, rounded, not usually squarish, thick; anthers dry and sterile; petals much crumpled in the bud, making it usually one-sided. *O. lata.*
Taller than *O. lata;* bud cones less thick than in *O. lata*, more squarish; leaves smaller and less rounded at the point; anthers producing pollen. *O. semilata.*

b. Petals emarginate or sometimes truncate.....j

Petals elliptical, capsules long and thin.
Stem low, weak; leaves very small, lanceolate, long and narrow, often ten times longer than broad. *O. elliptica.*
Strongly branched, less than one metre high; leaves very small, nearly linear. *O. sublinearis.*

e. Rosette leaves whitish, young rosette otherwise very much as in *O. oblonga;* flowers pale yellow; capsules small with few seeds. *O. albida.*

Rosette leaves nearest those of *O. Lamarckiana*, but narrower, usually shorter and less crinkled, usually but not always with midribs rather conspicuously red on the upper surface; stem leaves also frequently with red midribs.

Rosette leaves with petioles usually red above but always green beneath. Sepals usually with red stripes of varying width, but hypanthium and median ridge of sepals always green. *O. rubrinervis.*

Rosette leaves with petioles more or less red above but conspicuously red on the lower surface. Calyx deep red throughout, including median ridge of sepals and the whole hypanthium. *O. rubricalyx.*

j. Rosette leaves more narrowly lanceolate than in *O. Lamarckiana*, of normal length, of uniform width for the greater part of their length, usually smooth and free from crinkling; stem leaves smooth, standing out rather straight from the stem, narrow and more or less furrow-shaped; capsules of normal size and shape. *O. laevifolia.*

Leaves small, with broad midrib; capsules short and thick, of half normal size or less, smooth. The bud-bearing portion of stalk above the flowers is longer than in other forms. *O. scintillans.*

Oenothera biennis Linnaeus.

Oenothera, foliis lanceolatis dentatis caule hispido. Miller, Figures of the most beautiful, useful and uncommon plants described in the Gardeners' Dictionary, etc. **2.** *pl. 189. f. 1.* Plate dated 1757.

Oenothera biennis Linn. Sturm's Deutschlands Flora. **8.** *pl. 35.* Nürnberg. 1812.—Ettingshausen und Pokorny, Physiotypia plantarum austriacarum. **10.** *pl. 926.* Prag. 1873.—Millspaugh, Medicinal plants. **1.** *pl. 60.* Philadelphia. 1892.

Onagra (*Oenothera*) *biennis* (L.) Scop. MacDougal, Mutants and hybrids of the Oenotheras. (Carnegie Pub. 24: 9. *pl. 3–6*). 1905.

The rosettes are various in the different races. Flowers small when open, about 3 cm. in diameter; style short, so that the anthers surround the stigma lobes, and self pollination of the flower invariably takes place before the bud opens, the ruptured anthers being in direct contact with the stigma lobes; buds small and rather pointed, squarish, usually greenish, or with more or less red on the sepals.

This "species" ranges throughout North America and undoubtedly contains a large number of geographic races, most

of which have not yet been isolated. The *O. biennis* which extends over a large part of Europe is still another form, or perhaps series of forms. The small flowers and the short style ensuring self-pollination are characters easily distinguishing it from all the derivatives of *O. Lamarckiana* and *O. grandiflora*.

OENOTHERA OAKESIANA (Robbins) S. Watson.

Vail in "Mutations, variations and relationships of the Oenotheras", (Carnegie Pub. 81 : 70. *pl. 15–17*). 1907.

This species is very close to *O. biennis*, the main differences enumerated by Robbins being the possession of spreading sepal tips, a longer and more taper capsule and larger seeds. The rosette leaves are oblong-ovate, obtuse, tapering to a white, margined petiole, dull or pale blue-green, nearly glabrous; later rosette leaves more or less strigose-pubescent, narrowly lanceolate, shallowly toothed at acute apex, more deeply notched at the slender, tapering base. Stem leaves narrowly lanceolate, acute and tapering at each end.

OENOTHERA MURICATA Linnaeus.

Flora Danica. *pl. 1752*. 1823.—Reichenbach, Icon. Fl. Ger. et Helv. **23.** *pl. 21*. 1898.—Vail in "Mutations, variations and relationships of the Oenotheras". p. 73. *pl. 21, 22*. 1907.

The flowers are somewhat smaller than in *O. biennis*, and the style shorter so that the stigma is below the stamens in the bud; buds pubescent with appressed and spreading hairs; rosette persisting when the plant is mature. Rosette leaves approximately denticulate, more deeply so toward the base, with a broad white-margined petiole. Stems angled, turning red and outer bark splitting into shreds at maturity.

OENOTHERA PARVIFLORA Linnaeus.

Meerburg, Plantae rariores. *pl. 34*. 1789. Vail in "Mutations, variations and relationships of the Oenotheras". p. 71. *pl. 18–20*. 1907.

Flowers very small; petals 8 mm. long; stigma situated below the stamens in the bud; rosette leaves long and slender, lanceolate or oblong-lanceolate, acutish, dark green and shiny; buds club-shaped with spreading sepal tips.

Rosette leaves lanceolate or oblong-lanceolate, acutish, more deeply notched at the long, tapering base, dark green and shiny, sparingly mottled with red.

Oenothera argillicola Mackenzie.

MacDougal, Mutants and hybrids of the Oenotheras. (Carnegie Pub. 24 : 11. *pl. 7*). 1905.

Flowers large, petals 4–4.5 cm. long (3–4 cm. long, Mackenzie); stigma projecting from the unopened bud; buds glabrous (no short hairs?); capsules glabrous, tapering. Rosette leaves glabrous or nearly so, except the sparingly ciliate margins, broadly linear to linear-spatulate, sinuate; petioles relatively stout. Stem very leafy; stem leaves linear-lanceolate.

The "glabrous" buds and capsules of *O. argillicola* apparently bring it nearer to *O. grandiflora* than to any other form.

Oenothera Simsiana Seringe.

Oenothera corymbosa Sims, Curtis's Bot. Mag. **45.** *pl. 1974.* 1818.
Oenothera Simsiana Ser. *Pl.* pub. with Acad. Intern. Géog. Botanique Bull. iii. **9.** 1900.—Vail in "Mutations, variations and relationships of the Oenotheras." (Carnegie Pub. 81 : 68. *pl. 13, 14*). 1907.

Flowers large, petals 4 cm. long, stigma surrounded by the stamens in the bud; buds densely appressed-pubescent (long hairs?); bud cone tapering only in terminal portion; erect free sepal tips mostly unequal. Rosette leaves oblong to obovate, gradually tapering to the broad petiole, light yellow-green; petiole white. Plant straggling in appearance; stem leaves oblong-lanceolate to lanceolate, acute or acuminate, coriaceous, very brittle, bright yellow-green, soon turning red.

Some of the hybrids between *O. Lamarckiana* forms and *O. biennis*, like *O. Simsiana* have a short style so that the anthers surround the stigma in the bud, but the petals are smaller than in *O. Lamarckiana*.

Oenothera grandiflora Aiton.

Oenothera grandiflora. Barton, A flora of North America. **1.** *pl. 6.* Philadelphia. 1821.—Probably the most accurate plate. The slender

rounded bud and delicate sepal tips are well represented. The stem leaf in *f.* **2** is also correct for *O. grandiflora*, but too broad for *O. Lamarckiana*.—Vail in "Mutations, variations and relationships of the Oenotheras." (Carnegie Pub. 81 : 66. *pl. 11, 12*). 1907.

Usually in cultures a loose rosette of few leaves, or in some cases no rosette at all. Especially when grown in conditions of high temperature and humidity, a much better rosette is formed and the later rosette leaves have a prominent series of basal lobes on each side of the midrib, easily distinguishing them from those of any of the *O. Lamarckiana* or *O. biennis* derivatives. The stem leaves are usually larger and broader than in *O. Lamarckiana* and largely free from crinkling. Flowers large, about 7 cm. in diameter when open; style long, protruding the stigma beyond the anthers and preventing pollination before the bud opens; buds smooth with a small amount of pubescence of *short* hairs; sepals thin and papery, often wrapped more or less diagonally around the bud: buds slender and rounded owing to thinness of sepals and less prominence of the longitudinal median ridge of the sepals; sepal tips usually long and very slender. These bud characters easily distinguish it from *O. Lamarckiana*. Red glands on stem present or absent.

OENOTHERA LAMARCKIANA Seringe.

Oenothera biennis. Sowerby's English Botany. **22.** *pl. 1534*. 1806.—Probably *O. Lamarckiana* rather than *O. grandiflora*, but sepal tips not well represented.

Oenothera grandiflora Sims, Curtis's Bot. Mag. **46.** *pl. 2068*. 1819.—Petals less strongly emarginate and much less cuneate than in this figure.

Oenothera biennis var. *grandiflora* Lindl. Edwards' Bot. Register. **19.** *pl. 1604*. 1833.—Probably *O. Lamarckiana*. Leaf (probably a rosette leaf or one of the lower stem leaves) much too narrowly lanceolate for *O. grandiflora*; sepal tips also too short and stout.

Oenothera Lamarckiana. Floral Mag. **2.** *pl. 78*. 1862.—The reddish buds and stem suggest *O. rubrinervis*.

Oenothera Lamarckiana Lemaire.—Illustration Horticole. **9.** *pl. 318*. 1862.—Copied, reversed, from the Floral Magazine.

Oenothera Lamarckiana Ser. DeVries, Die Mutationstheorie. **1 :** 213. *f. 55*, whole plant; **1 :** 227. *f. 61*, flowering shoot; **1 :** 228. *f. 62*, rosette leaf; **1 :** 229. *f. 64*, young rosette; **1 :** 230. *f. 66*, very young rosette; **1 :** 320. *f. 99*, fruits; **1 :** 153. *f. 42*, flower nat. size; **1 :** 169.

f. 46, buds; **1**: 192. *pl. 1*, colored; **1**: 289. *f. 89*, rosette leaf, bract and terminal rosette; **1**: 378. *f. 114*, dry fruits; **2**: 240. *pl. 1*, colored; **2**: 496. *pl.* 3, colored.

For figures of *O. Lamarckiana* and its mutants, see DeVries, Die Mutationstheorie, 1901 and 1903; Recherches expérimentales sur l' origine des espèces (Rev. gén. de bot. **13**: 5–17). 1901.—MacDougal, Mutation in plants (Am. Nat. **37**: 737–770). 1903. Printed also in Contrib. N. Y. Bot. Garden, no. 48. figs. 8.—MacDougal *et al.*, Mutants and hybrids of the Oenotheras (Carnegie Pub. no. 24). 1905: and Mutations, variations and relationships of the Oenotheras (Carnegie Pub. no. 81). 1907.

Flowers large, about 7 cm. in diameter, style long, as in *O. grandiflora*. Buds pubescent, with numerous *long* and short hairs, sepals somewhat thicker than in *O. grandiflora*, and median ridge more prominent, giving a characteristic squarish appearance to the buds. Sepal tips awl-shaped, stouter than in *O. grandiflora*. These numerous characters of the sepals make it possible to distinguish the *O. Lamarckiana* and *O. grandiflora* buds without any difficulty. Although the differences are all purely quantitative in character, yet their summation gives an entirely different aspect to the bud in the two cases.

Rosette leaves usually much crinkled, rather broadly lanceolate, pointed, usually without red on midribs; petiole margined for some distance. A rosette is always formed and the rosette stage usually (in cultures) lasts about four months after the planting of the seeds. Stem leaves crinkled. Red glands on stem and ovaries. Sepals usually green, but sometimes with reddish stripes. The *O. Lamarckiana* forms usually come into bloom later than *O. grandiflora*.

Oenothera rubrinervis DeVries.

See under *O. Lamarckiana*. Die Mutationstheorie. **1**: 162. *f. 43*, flowering shoot; **1**: 199. *f. 49*, whole plant; **1**: 207. *f. 52*, rosette leaves; **1**: 209. *f. 54*, rosette leaves; **1**: 231–238. *f. 67, 68, 70*, whole plant; **1**: 320. *f. 99*, fruits; **2**: 496. *pl. 3*, colored.

Rosette leaves narrower, usually shorter and less crinkled than in *O. Lamarckiana*, whitish, and usually but not always

with rather conspicuous red midribs; stem leaves also frequently with red midribs, otherwise very similar to those of *O. Lamarckiana*, not always whitish. Petioles of rosette leaves margined for some distance. Sepals usually with conspicuous red stripes varying in width. Hypanthium green. Stem generally less stout than in *O. Lamarckiana*, usually with more side branches and sometimes slightly zigzag.

Oenothera rubricalyx.

This conspicuous form first originated in my cultures as a mutant from *O. rubrinervis* two years ago. The same identical type has since appeared as one of two types in the F_1 of *O. nanella* pollinated from a certain strain of *O. biennis*. In both cases it breeds true except for certain individuals which revert to *O. rubrinervis*, the percentage of reversions being a simple Mendelian ratio in the last case, and possibly also in the first. A full description of this form will appear elsewhere in connection with an account of *Oenothera* cultures.

O. rubricalyx is clearly distinct from *O. rubrinervis* and there are no intermediate forms. The only distinguishing feature of this mutant is its greatly increased production of red pigment (anthocyan). It is differentiated from *O. rubrinervis* in having much pigment on the *under* surface of the rosette leaf petioles, and on the hypanthium as well as the whole of the sepal, including the median longitudinal ridge. This latter makes the buds very conspicuous so that they are distinguishable from *O. rubrinervis* at a glance. There is also an increase in pigment production on the stem and in other parts of the plant.

OENOTHERA LATA DeVries.

See under *O. Lamarckiana*. Die Mutationstheorie. **1**: 169. *f. 46*, buds; **1**: 220. *f. 58*, leaf; **1**: 288. *f. 88*, flowering shoot; **1**: 289. *f. 89*, rosette leaf, bract and terminal rosette; **1**: 294. *f. 91*, rosette; **1**: 295. *f. 92*, rosette; **1**: 321. *f. 101*, fruits; **2**: 240. *pl. 1*, colored; **2**: 496. *pl. 3*, colored.

Rosette leaves very broad, oblong, with very obtuse tips, lighter green and very much crinkled. Stems often weak and more or less decumbent. Buds greenish, rounded and

barrel-shaped, not usually squarish, thick; anthers dry and sterile; petals much crumpled in the bud, arranged so as to make it usually one-sided.

The *O. lata* from Liverpool, England, is a stronger form which has less difficulty in forming a stalk, having buds of normal squarish shape, and producing a considerable amount of good pollen, so that self-pollination can be effected without difficulty. This brings it very close to *O. semilata*, but the characters of the rosette and stem leaves are those of *O. lata* rather than *O. semilata*.

OENOTHERA GIGAS DeVries.

See under *O. Lamarckiana*. Die Mutationstheorie. **1**: 192. *pl. 2*, colored; **1**: 226. *f. 60*, flowering shoot; **1**: 228. *f. 62*, rosette leaf; **1**: 229. *f. 63*, young rosette; **1**: 230. *f. 66*, very young rosette; **1**: 321. *f. 101*, fruits; **2**: 496. *pl. 3*, colored.

Larger than the other mutants in nearly all its parts. Rosettes of very large, crinkled leaves, very variable in shape but usually very broad, sometimes nearly orbicular, sharply narrowed to petiole and much crinkled. Internodes and capsules shorter and thicker than in *O. Lamarckiana*. Bud cone and hypanthium thicker, petals broader. *O. gigas nanella* is a dwarf sub-type of *O. gigas*.

OENOTHERA NANELLA DeVries.

See under *O. Lamarckiana*. Die Mutationstheorie. **1**: 165. *f. 45*, whole plants; **1**: 256. *f. 77*, flowering shoot; **1**: 257. *f. 78*, very young rosette; **1**: 260. *f. 79*, young rosettes; **1**: 267. *f. 80*, buds on stem tip; **2**: 240. *pl. 1*, colored; **2**: 496. *pl. 3*, colored.

Rosette leaves variable in shape, small, usually broad and very obtuse, not much crinkled, sessile or with very short petioles, forming a compact rosette. Internodes very short, so that the plant usually reaches a height of only 10 to 20 cm. Flowers almost full size.

OENOTHERA LAEVIFOLIA DeVries.

Die Mutationstheorie. **1**: 218. *f. 56*, flowering shoot; **1**: 221. *f. 59*, small flowers.

Rosette leaves more narrowly lanceolate than in *O. Lamarckiana*, of uniform width for the greater part of their

length, usually smooth and free from crinkling. Stem leaves smooth, standing out rather straight from the stem, narrow and more or less furrow-shaped. Buds may be greenish, or with a red color pattern as in *O. rubrinervis*.

OENOTHERA BREVISTYLIS DeVries.

Die Mutationstheorie. **2**: 430. *f. 80*, flower; **2**: 431. *f. 81*, flowers; **2**: 431. *f. 82*, parts of flowers; **2**: 434. *f. 84*, whole plant; **2**: 434. *f. 85*, fruits.

Rosette leaves rather broader than in *O. Lamarckiana*, with very broad, obtuse, rounded tips. Bracts of terminal rosettes broader and more rounded at tip than in *O. Lamarckiana*. Style very short, usually not projecting above the calyx tube. Sepal tips very short. Buds may have a red color pattern, as in *O. rubrinervis*.

OENOTHERA OBLONGA DeVries.

See under *O. Lamarckiana*. Die Mutationstheorie. **1**: 163. *f. 64*, flowering shoot; **1**: 200. *f. 50*, whole plant; **1**: 239. *f. 71*, flowering stem; **1**: 244. *f. 74*, young rosette: **1**: 321. *f. 100*, fruits; **1**: 384. *pl. 6*, colored.

Rosette leaves smaller than in *O. Lamarckiana*, oblong with rounded tip, much crinkled, with a long, broad, unmargined petiole. In my cultures, *O. oblonga* has appeared at various times, especially from crosses, but I have never been able to rear it beyond the rosette stage.

OENOTHERA ALBIDA DeVries.

See under *O. Lamarckiana*. Die Mutationstheorie. **1**: 192. *pl. 3*, colored; **1**: 248. *f. 75, 76*, young rosettes; **1**: 320. *f. 99*, fruits.

Rosette leaves whitish. Young rosette otherwise very much as in *O. oblonga*. Capsules small, with few seeds. Flowers pale yellow. Stems somewhat zigzag and very brittle.

OENOTHERA LEPTOCARPA DeVries.

Only distinguishable in the adult stage from *O. Lamarckiana*, from which it differs in beginning to bloom later in the season, and in having few branches. The leaves are like those of *O. Lamarckiana*, but closely clothe the stem. The capsules are long and thin.

OENOTHERA SEMILATA DeVries.

Taller than *O. lata*. Bud cones less thick than *O. lata;* inflorescence looser and longer; leaves smaller and less rounded at the point. Produces pollen, but less than *O. Lamarckiana*.

OENOTHERA SCINTILLANS DeVries.

Die Mutationstheorie. **1 : 171.** *f. 47*, flowering shoot; **1 : 272.** *f. 81, 82*, rosettes; **1 : 321.** *f. 100*, fruits; **1 : 384.** *pl. 5*, colored; **2 : 496.** *pl. 3*, colored.

Seedling leaves broadest in the middle, small with broad petiole and midvein, very smooth and glossy, dark green. Leaves small, green, smooth, with broad midvein, whitish. The bud-bearing portion of the stalk above the flowers is longer than in other forms. The capsules are short and thick, half normal size or less; seeds small; fruits smooth.

OENOTHERA ELLIPTICA DeVries.

Die Mutationstheorie. **1 : 281.** *f. 83*, shoot, rosette and rosette leaf; **1 : 282.** *f. 84*, flower natural size.

Seedling leaves broadest in the middle, very long with long petiole. Stem short and weak. Leaves very small, lanceolate, long and narrow, often ten times longer than broad. Capsules long and thin. Petals elliptical.

OENOTHERA SUBLINEARIS DeVries.

Die Mutationstheorie. **1 : 285.** *f. 85*, whole plants; *f. 86*, rosette leaf; *f. 87*, petals.

Seedling leaves of equal breadth throughout the greater part of their length, whitish, little crinkled, scarcely narrowed at the stem, nearly grass-like. Strongly branched (less than one metre high), branches standing out stiffly, mostly very weak. Leaves very small, nearly linear. Capsules long and thin. Petals elliptical.

One other form, whose position is doubtful, may be included in this list.

OENOTHERA AMMOPHILA Focke.

Briefly described in Abh. Nat. Ver. Bremen. **18**: 182–186. 1906.

From the coast near Bremen, Germany.

Rosette leaves small, long, narrowed into a petiole, both sides thickly clothed with appressed hairs. The rosette remains after the stem is formed in the second year. Stems .5–1 m. high. Stem and capsules covered with short, club-shaped (?) hairs. Also scattered long pointed hairs which arise from reddish protuberances. These are evidently the same two types of hairs found in *O. Lamarckiana* and its derivatives and in *O. biennis*. The petals are similar to those of *O. biennis* but smaller, slightly crenate. It is like *O. muricata* in having petiolate rosette leaves and small stem leaves, in its pubescence and the crenate petals; but it differs in having large flowers and longer sepals. It also resembles *O. muricata* in that the rosette of the previous year remains after the stem is formed in the second year. The cultures of MacDougal (Carnegie Pub. no. 81. 1907) have shown that *O. ammophila* may produce bud reversions to *O. biennis*, which makes it probable that *O. ammophila* is a hybrid between *O. biennis* and some other form. The leaves are smaller and narrower than in *O. biennis*.

August 18, 1909.

THE MISSOURI SAXIFRAGES.

BY B. F. BUSH.

The genus *Micranthes* of eastern North America, which has generally been referred to the genus *Saxifraga*, is represented by some twenty species, mostly plants of alpine heights and mountainous regions, and therefore not likely to be found in the low altitude of the States of the Mississippi Valley, only the two lowland species reaching our northeastern borders. A species of the Southwest, but little known, native of sandy woods and bottoms and rocky barrens, has been ascertained to reach our southwestern borders, where it is native of the cherty rocky barrens. Through the kindness of Professor Trelease, I have been permitted to examine all of the Missouri material of this genus, and also some specimens from elsewhere, and after a careful study of this material, I make for the Missouri species the following arrangement:

Acaulescent, the principal leaves in a basal rosette; scapes naked below the inflorescence, minutely bracted above.

Sepals reflexed; plants large, 3–10 dm. tall; leaves denticulate or entire. *Micranthes pennsylvanica.*

Sepals erect; plants low, 5–45 cm. tall; leaves dentate.

Petals oblong, twice or thrice as long as wide, much longer than the sepals; pedicels slender, glandular-pubescent. *Micranthes virginiensis.*

Petals obovate, one to one and one-half times as long as wide, a little longer than the sepals; pedicels stout, glabrous. *Micranthes texana.*

MICRANTHES PENNSYLVANICA (L.) Haw. Saxifr. Enum. 45. 1821.

Saxifraga pennsylvanica L. Sp. Pl. 399. 1753.

Saxifraga Forbesii Vasey, Am. Entom. & Bot. **2**: 288. 1870, based on specimens collected by Forbes at Makanda, Illinois, is said to differ in having thinner leaves, which are pilose beneath, and to it all the Missouri specimens have been referred. I have been unable to separate this from *M. pennsylvanica*, as I find the thickness of the leaves and pubescence very variable. If, however, the species must be maintained, *Saxifraga Forbesii* Vasey, should be written **Micranthes Forbesii** (Vasey) new comb.

A species of low meadows and swamps, ranging from Ont. to Minn. and Me. southward to Ga. and Ala. and on rocky bluffs to Ia., Ill. and Mo.

Specimens examined: MISSOURI: Allenton, *Letterman*, June 15, 1875, under shady rocks; *Letterman*, April 1880, on wet sandy rocks: Jefferson County, *Eggert*, May 11, 1887, sandy rocks opposite Pacific; *Eggert*, May 8, 1896, sandy rocks opposite Pacific; Silica, Jefferson County, *Russell*, May 5, 1898, wet shaded sandstone cliffs; Saint Louis County, *Letterman*, June 20, 1884; *Letterman*, April 15, 1880; *Eggert*, July, 1880, on shady sandstone; *Engelmann*, raised in garden in 1876 and 1877, probably from seeds collected by Letterman in 1875. ILLINOIS: Makanda, *C. F. Baker* 6168, May 5, 1900, on moist cliffs (type station of *Saxifraga Forbesii* Vasey, but with the leaves nearly glabrous, instead of pilose beneath as described in Gray's Manual): Wady Petra, *V. W. Chase*, May 12, 1897, on wet prairie; Cook County, *W. W. Babcock*, May, 1869. IOWA: Iowa City, Hitchcock, no date; Johnson County, *T. J. Fitzpatrick*, May 11, 1895.

MICRANTHES VIRGINIENSIS (L.) Small, Fl. S. U. S. 502. 1903.

Saxifraga virginiensis Michx. Fl. Bor. Am. **2**: 569. 1803.

A species of dry rocky woodlands and hillsides, from Ont. to Minn., and N. B. south to Va., Ga., Ala., Tenn., Ill. and Mo.

Specimens examined: MISSOURI: Silica, Jefferson County, *Eggert*, April 14, 1887, on sand rocks; *Eggert*, May 20, 1887, on sand rocks; *Eggert*, April 18, 1896, sandy rocks; *Trelease*, April 2, 1899; *Russell*, May 5, 1898, sandstone cliffs, thus, there being but one known locality for this species in the state.

MICRANTHES TEXANA (Buckley) Small, l. c. 501. 1903.

Saxifraga texana Buckley, Proc. Acad. Phila. **1861**: 455. 1862.

Scapes from a cluster of tuberous roots, 5–15 cm. tall, sparingly short-branched above, nearly glabrous. Leaf blades 1–3 cm. long, ovate to ovate-oblong, thickish, obtuse, entire or crenate-serrate; branches of the inflorescence short,

the cymules congested; sepals oblong to ovate, slightly shorter than the hypanthium; corolla white or often pink or rose-colored, 4–5 mm. broad; petals nearly equal, 2–3 mm. long, obovate, but little exceeding the sepals; filaments subulate; follicles united at base, 3–4 mm. high, slightly longer than the sepals, the style-beaks not diverging.—Sandy woods and bottoms and in rocky barrens, Missouri to Texas.

Resembles *M. virginiensis*, but is more or less glabrous, at least the inflorescence, and is lower.

Specimens examined: MISSOURI: Graydon Springs, Greene County, *Standley* 1, May 7, 1905, rocky barrens; Reding's Mill, *Bush* and *Palmer* 5475, April 8, 1909, on the Grand Falls Chert barrens, in company with *Portulaca pilosa, Sedum Torreyi, Sedum pulchellum, Alsinopsis patula, Talinum parviflorum, Talinum calycinum, Lathyrus pusillus* and *Cheilanthes lanosa.* TEXAS: Terrell to Elmo, *Reverchon* 3729, April 6, 1903, in damp sandy soil: Between Frenchtown and Dallas, *Reverchon*, 287, very rare, in black sandy land: Brazos County, *H. Ness* 1994, March 10, 1900, in sandy land: No locality or date, *Reverchon:* Groesbeck, *Joor* 87, February 27, 1887.

LIBRARY CONTRIBUTIONS.

A LIST OF BOOKS AND PAPERS PUBLISHED FROM THE MISSOURI BOTANICAL GARDEN OR BY ITS EMPLOYEES, OR BASED CHIEFLY ON WORK DONE BY AID OF THE FACILITIES OF THE GARDEN, FROM JANUARY, 1904, TO DECEMBER, 1908, INCLUSIVE.*

BY LAURA BROWN.

364. **Balthis, F. K.** Amorphophallus Rivieri. Horticulture. **1**: 497. 1905.

365. —— Edelweiss. Floral Life. **3**: 5. *f.* 1905.

366. —— Poinsettia. (Euphorbia pulcherrima). Horticulture. **1**: 413. 1905.

367. **Berger, A.** A systematic revision of the genus Cereus Mill. Rept. Mo. Bot. Gard. **16**: 57–86. *pl. 1–12.* 1905.

368. **Bessey, E. A.** The Florida strangling figs. Rept. Mo. Bot. Gard. **19**: 25–33. *pl. 1–9.* 1908.

369. **Blankinship, J. W.** Plantae Lindheimerianae. Part III. Rept. Mo. Bot. Gard. **18**: 123–223. 1907.

370. **Bush, B. F.** The genus Othake. Trans. Acad. Sci. St. Louis. **14**: 171–180. 1904.

371. —— The Texas Tradescantias. Trans. Acad. Sci. St. Louis. **14**: 181–193. 1904.

372. —— The North American species of Fuirena. Rept. Mo. Bot. Gard. **16**: 87–99. 1905.

373. —— Two new Texas Tradescantias. Rept. Mo. Bot. Gard. **16**: 100–101. 1905.

374. —— Some new Texas plants. Rept. Mo. Bot. Gard. **17**: 119–125. 1906.

Bush, B. F.—See K. K. Mackenzie.

375. **Conard, H. S.** and H. Hus. Waterlilies and how to grow them. New York. 1907.

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* Supplementary to lists in Rept. Mo. Bot. Gard. **8**: 221–236, **10**: 85–90, **15**: 87–97.—Nos. 243, 244, and 511–513 inclusive as publications from the Henry Shaw School of Botany.

Coulter, S. M.—See No. 510.

Cunningham, A. D.—See R. J. LACKLAND, Report of the officers of the Board.

376. **Drummond, J. R.** The literature of Furcraea with a synopsis of the known species. Rept. Mo. Bot. Gard. **18**: 25–75. *pl. 1–14.* 1907.

Fulks, E. B.—See VON SCHRENK, H., E. B. FULKS and A. L. KAMMERER.

377. **Glatfelter, N. M.** Preliminary list of higher fungi collected in the vicinity of St. Louis, Mo., from 1898–1905. Trans. Acad. Sci. St. Louis. **16**: 33–94. 1906.

378. **Griffiths, D.** Illustrated studies in the genus Opuntia.—I. Rept. Mo. Bot. Gard. **19**: 259–272. *pl. 21–28.* 1908.

379. **Harris, J. A.** Apparently imparipinnate leaves in Cassia. Pl. World. **9**: 139–142. *f. 20.* 1906.

380. —— Ascidia in Gasteria and Agave. Rept. Mo. Bot. Gard. **17**: 126–132. *f. 1–6.* 1906.

381. —— Biological Society of St. Louis. Science. n. s. **20**: 241–244. 1904.

382. —— The experimental data of the mutation theory. Monist. **16**: 254–293. 1906.

383. —— The fruit of Opuntia. Bull. Torr. Bot. Club. **32**: 531–536. 1905.

384. —— Heredity. Bull. Washington Univ. Assoc. **6**: 58–79. 1908.

385. —— The importance of investigations of seedling stages. Science. n. s. **22**: 184–186. 1905.

386. —— The influence of the Apidae upon the geographical distribution of certain floral types. Canadian Entomologist. **37**: 353–357, 373–380, 393–398. 1905.

387. —— New fasciations. Torreya. **5**: 157–160. 1905.

388. —— A new theory of the origin of species. Open Court. **18**: 193–202. 1904.

389. —— The origin of species by mutation. Monist. **14**: 641–671. 1904.

390. —— Prolification of the fruit in Capsicum and Passiflora. Rept. Mo. Bot. Gard. **17**: 133–145. *f. 1–3.* 1906.

391. —— Syncarpy in Martynia lutea. Torreya. **6**: 25–28. *f. 1.* 1906.
392. —— [Reviews of current literature]. Bot. Centralblatt; Bot. Gazette; Amer. Naturalist. 1904–1907.
393. —— [Secretary's abstracts of proceedings of the Academy of Science of St. Louis]. Science. 1907.

Harris, J. A. See nos. 243, 244, 512 and 513.

394. **Hedgcock, G. G.** The crown-gall and hairy-root diseases of the apple tree. Bull. U. S. Dept. Agr., Bur. Pl. Ind. 90: 15–17. *pl 3–5.* 1906.
395. —— The crown-gall disease of the grape vine. Bull. N. M. Agr. Exp. Sta. 58 : 30–31. 1906.
396. —— A disease of cauliflower and cabbage caused by Sclerotinia. Rept. Mo. Bot. Gard. **16**: 149–151. *pl. 32–34.* 1905.
397. —— A disease of cultivated Agaves due to Colletotrichum. Rept. Mo. Bot. Gard. **16**: 153–156. *pl. 35–37.* 1905.
398. —— A note on Rhizoctonia. Science. n.s. **19**: 268. 1904.
399. —— Proof of the identity of Phoma and Phyllosticta on the sugar beet. Journ. Mycology. **10**: 2–3. 1904.
400. —— Some of the results of three years' experimentation with crown gall. National Nurseryman. **13**: 129. 1905.
401. —— Some of the results of three years' experiments with crown gall. Science. n. s. **22**: 120–122. 1905.
402. —— Some wood staining fungi from various localities in the United States. Journ. Mycology. **12**: 204–210. 1906.
403. —— Studies upon some chromogenic fungi which discolor wood. Rept. Mo. Bot. Gard. **17**: 59–114. *pl. 3–12.* 1906.
404. —— Zonation in artificial cultures of Cephalothecium and other fungi. Rept. Mo. Bot. Gard. **17**: 115–117. *pl. 13–16.* 1906.
405. —— [Mycological abstracts]. Botanisches Centralblatt. 1904–1907.

Hedgcock, G. G.—See VON SCHRENK, H. and G. G. HEDGCOCK.

406. **Hedgcock, G. G.** and P. Spaulding. A new method of mounting fungi grown in cultures for the herbarium. Journ. Mycology. **12**: 147. 1906.
407. **Hitchcock, A. S.** The identification of Walter's grasses. Rept. Mo. Bot. Gard. **16**: 31–56. 1905.
408. **Hus, H.** An abnormal Odontoglossum Cervantesii. Rept. Mo. Bot. Gard. **18**: 95–97. *pl. 9.* 1907.
409. —— An ecological cross section of the Mississippi river in the region of St. Louis, Missouri. Rept. Mo. Bot. Gard. **19**: 127–258. *pl. 10–20.* 1908.
410. —— Fasciation in Oxalis crenata and experimental production of fasciations. Rept. Mo. Bot. Gard. **17**: 147–152. *pl. 17–19.* 1906.
411. —— Fasciations of known causation. Amer. Nat. **42**: 81–97. *f. 1–2.* 1908.
412. —— The germination of Hydrastis canadensis. Rept. Mo. Bot. Gard. **18**: 85–94. *pl. 8.* 1907.
413. —— How to make a water-lily pond. Garden Magazine. **6**: 285–287. 1908.
414. —— Hugo de Vries. Open Court. **20**: 713–725. 1906.
415. —— Influence of man on the form of plants. Trans. Acad. Sci. St. Louis. **15**: xxx–xxxi. 1905.
416. —— Over Sepalodie van de Kroonbladen van Oenothera-soorten. Bot. Jaarb. Dodonaea. **13**: 1–44. *pl. 1–15.* 1907.
417. —— Virescence of Oxalis stricta. Rept. Mo. Bot. Gard. **18**: 99–108. *pl. 10–11. f. 1–4.* 1907.
418. —— [Abstracts]. Bot. Centralblatt. 1905–1907.
419. —— [Reviews]. Amer. Nat. 1906–07.

Hus, H. — See Conard, H. S. and H. Hus.

420. **Irish, H. C.** Foliage plants at the Missouri Botanical Garden. Florists' Exchange. **18**: 146. *f.* 1904.
421. —— Hardy shrubs. Ann. Rept. Mo. Hort. Soc. **47**: 76–77. 1904.
422. —— The home grounds. Trans. Ill. Hort. Soc. **41**: 489–496. 1907.
423. —— On ornamentals. Ann. Rept. Mo. Hort. Soc. **48**: 349–350. 1905.

424. —— [Secretary's abstracts of proceedings of the National Council of Horticulture]. 1905–1908. In several horticultural journals.
425. **Jones, S. C.** American Apple Growers. Farm, Field and Fireside. Sept. 1, 1906.
426. —— Apple Growers' Congress. Farm, Field and Fireside. Sept. 8, 1906.
427. —— Field growing of Narcissus. Amer. Florist. **27**: 125–128. 1906.
428. —— Flowers that thrive. Farm, Field and Fireside. May 12, 1906.
429. —— Hardy Japanese fruit. Farm, Field and Fireside. July 8, 1905.
430. —— Porch vines. Farm, Field and Fireside. March 31, 1906.
431. —— The strawberry field. Farm, Field and Fireside. June 10, 1905.
432. —— A tub water garden. Farm, Field and Fireside. July, 1906.
433. —— Weekly notes on the World's Fair. Farm, Field and Fireside. 1904.

Kammerer, A. L.—See VON SCHRENK, H., E. B. FULKS and A. L. KAMMERER.

434. **Lackland, R. J.** Report of the officers of the Board. Rept. Mo. Bot. Gard. **15**: 7–12. 1904. **16**: 7–12. 1905. **17**: 7–27. 1906. **18**: 7–10. 1907. **19**: 7–10. 1908.
435. **Life, A. C.** An abnormal Ambrosia. Bot. Gaz. **38**: 383–384. *f. 1–3.* 1904.
436. —— Effect of light upon the germination of spores and the gametophyte of ferns. Rept. Mo. Bot. Gard. **18**: 109–122. *f. 1–2.* 1907.

Life, A. C.—See no. 511.

437. **Livingston, B. E.** Evaporation and centers of plant distribution. Plant World. **11**: 106–112. 1908.
438. —— Evaporation and plant habitats. Plant World. **11**: 1–9. 1908.
439. —— Relative transpiration in cacti. Plant World. **10**: 110–114. *f. 19.* 1907.

440. **Lyon, H. L.** The embryogeny of Ginkgo. Minn. Bot. Studies. **3**: 275–283. *pl. 29–43.* 1904.
441. **McClure, G. E.** Aquatics at the World's Fair. Amer. Gard. **25**: 635–636. 1904.
442. —— The French garden at the World's Fair. Amer. Gard. **25**: 683–684. 1904.
443. —— Garden and landscape features at the St. Louis World's Fair. Amer. Gard. **25**: 475–476. 1904.
444. —— In the gardens at St. Louis. Amer. Gard. **25**: 523–524. 1904.
445. —— The Japanese garden at the World's Fair. Amer. Gard. **25**: 571–572. 1904.
446. —— Noteworthy plant exhibits at the St. Louis Convention. Amer. Gard. **25**: 558. 1904.
447. —— Orchid collection, Missouri Botanical Garden. Amer. Flor. **17**: 790. *4 ff.* 1904.
448. **Mackenzie, K. K.** and B. F. Bush. New plants from Missouri. Rept. Mo. Bot. Gard. **16**: 102–108. 1905.

Peck, C. H.—See Saccardo, P. A., C. H. Peck and W. Trelease.

449. **Pring, G. H.** Coryanthes maculata. Amer. Florist. **30**: 326. *ff.* 1908.
450. —— Cultivation of orchids. Weekly Florists' Review. Dec. 20, 1906.
451. —— Vanda Sanderiana. Florists' Exchange. **23**: 454–455. *f.* 1907.
452. **Saccardo, P. A.,** C. H. Peck and W. Trelease. The fungi of Alaska. Harriman Alaska Expedition. **5**: 13–64. *pl. 2–7.* 1904.
453. **Sargent, C. S.** Crataegus in Missouri. Rept. Mo. Bot. Gard. **19**: 35–126. 1908.
454. **von Schrenk, H.** Branch cankers of Rhododendron. Rept. Mo. Bot. Gard. **18**: 77–80. *pl. 5–6.* 1907.
456. —— Constriction of twigs by the bag worm and incident evidence of growth pressure. Rept. Mo. Bot. Gard. **17**: 153–181. *f. 1–3. pl. 20–26.* Diagr. 1–2. 1906.
457. —— Creosote plants will treat two million Frisco ties this year. The Frisco-man. **1**: 7–11. *5 ff.* Nov. 1907.

458. —— Cross-tie forms and rail fastenings with special reference to treated timbers. Bull. U. S. Dept. Agr., Bur. Forest. 50 : 1–70. *f. 1–71. pl. 1–5.* 1904.

459. —— Disease of sycamore trees. Plant World. **10 : 265.** 1907.

460. —— A general consideration of timber under conditions of modern demand and growth. O. 46 pp. Boston. 1907.

461. —— Glassy fir. Rept. Mo. Bot. Gard. **16 : 117–120.** *pl. 20–21.* 1905.

462. —— Intumescences formed as a result of chemical stimulation. Rept. Mo. Bot. Gard. **16 : 125–148.** *pl. 25–31.* 1905.

463. —— On frost injuries to sycamore buds. Rept. Mo. Bot. Gard. **18 : 81–83.** *pl. 7.* 1907.

464. —— On the occurrence of Peronospora parasitica on cauliflower. Rept. Mo. Bot. Gard. **16 : 121–124.** *pl. 22–24.* 1905.

465. —— Recent progress in timber preservation. Ann. Rep. Indiana State Board Forestry. **4 : 64–78.** *f. 46–48.* 1904.

466. —— Recent progress in timber preservation. Yearbook U. S. Dept. Agr. **1903 : 427–440.** *pl. 53–55.* 1904.

467. —— Report of committee Q on standard specifications for the grading of structural timber. Proc. Am. Soc. Test. Mater. **5 : 1–3.** 1905.

468. —— Report on the condition of treated timbers laid in Texas, February, 1902. Bull. U. S. Dept. Agr., Bur. Forest. 51 : 1–45. *pl. 1–2.* 1904.

469. —— Sap-rot and other diseases of the red gum. Bull. U. S. Dept. Agr., Bur. Pl. Ind. 114 : 1–37. *pl. 1–8.* 1907.

470. —— Seasoning of timber. Bull. U. S. Dept. Agr., Bur. Forest. 41 : 1–48. *pl. 1–18.* 1903.

471. —— Some phases of the modern use of lumber. St. Louis Lumberman. 1907.

472. —— Tupelo. Southern Lumberman. **51 : 41–43.** *ff.* Dec., 1907.

473. —— Die Wurzelbildung der Loblolly-Kiefer [Pinus taeda]. Naturw. Zeitschr. Land- u. Forstw. **3 : 431–433.** *pl.* 1905.

474. **von Schrenk, H.** and G. G. Hedgcock. Crown-gall and hairy-root diseases of the apple tree. Ann. Rept. Mo. Hort. Soc. **49**: 252–253. 1906.
475. —— The wrapping of apple grafts and its relation to the crown-gall disease. U. S. Dept. Agr., Bur. Pl. Ind. Bull. 100: 13–20. 1907.
476. **von Schrenk, H.,** E. B. Fulks and A. L. Kammerer. Changes which take place in coal-tar creosote during exposure. Bull. Amer. Railway Engineering and Maintenance of Way Assoc. 93: 1–27. 1907.
477. **Spaulding, P.** A biographical history of botany at St. Louis, Missouri. Pop. Sci. Monthly. **73**: 488–499. *f. 1–2.* 1908; **74**: 48–57, 124–133, 240–258. *f. 3–19.* 1909.
478. —— A blight disease of young conifers. Science. n. s. **26**: 220. 1907.
479. —— A disease of black oaks caused by Polyporus obtusus Berk. Rept. Mo. Bot. Gard. **16**: 109–116. *pl. 13–19.* 1905.
480. —— Heart rot of Sassafras sassafras caused by Fomes ribis. Science. n. s. **26**: 479. 1907.
481. —— Studies on the lignin and cellulose of wood. Rept. Mo. Bot. Gard. **17**: 41–58. *pl. 1–2.* 1906.
482. —— Two fungi growing in holes made by wood-boring insects. Rept. Mo. Bot. Gard. **15**: 73–77. *pl. 25–27.* 1904.
483. —— [Mycological abstracts]. Botanisches Centralblatt. 1904–1907.

Spaulding, P. — See Hedgcock, G. G. and P. Spaulding.

484. **Thompson, C. H.** Agaves at Missouri Botanical Garden. Florists' Exchange. **18**: 262. *2 ff.* 1904.
485. —— Cacti at Missouri Botanical Garden. Florists' Exchange. **18**: 16. *2 ff.* 1904.
486. —— Succulent plants. Amer. Florist. **30**: 384–385. *ff.* 1908.
487. **Trelease, W.** Aberrant veil remnants in some edible agarics. Rep. Mo. Bot. Gard. **15**: 83–85. *pl. 30–39.* 1904.
488. —— Additions to the genus Yucca. Rept. Mo. Bot. Gard. **18**: 225–230. *pl. 12–17.* 1907.

489. —— Address before the Central Botanists. Science. n. s. **23**: 97–100. 1906.
490. —— Agave macroacantha and allied Euagaves. Rept. Mo. Bot. Gard. **18**: 231–256. *pl. 18–34.* 1907.
491. —— Agave rigida—Furcraea rigida—Agave angustifolia. Rept. Mo. Bot. Gard. **19**: 273–287. *pl. 29–35.* 1908.
492. —— Alaskan species of Sphagnum. Harriman Alaska Expedition. **5**: 331–337. 1904.
493. —— The American Society of Naturalists. What academic degrees should be conferred for scientific work. Science. n. s. **19**: 809–810. 1904.
494. —— Annual report of the director. Rept. Mo. Bot. Gard. **15**: 13–37. 1904. **16**: 13–30. 1905. **17**: 28–40. 1906. **18**: 11–24. 1907. **19**: 11–23. 1908.
495. —— Botanical Society of America. Science. n. s. **23**: 221–222. 1906.
496. —— Carl von Linné. Horticulture. **5**: 681. *Portrait.* 1907.
497. —— The century plant and some other plants of the dry country. Pop. Sci. Monthly. **70**: 207–228. *f. 1–22.* 1907.
498. —— Cooperation in biological research. Science. n. s. **27**: 373–375. 1908.
499. —— Cryptogamic botany of Alaska, introduction. Harriman Alaska Expedition. **5**: 1–9. 1904.
500. —— An ecologically aberrant Begonia. Rept. Mo. Bot. Gard. **15**: 79–81. *pl. 28–29.* 1904.
501. —— The ferns and fern allies of Alaska. Harriman Alaska Expedition. **5**: 375–398. *pl. 44.* 1904.
502. —— Illustrations of a "strangling" fig tree. Rept. Mo. Bot. Gard. **16**: 161–165. *pl. 39–45.* 1905.
503. —— A list of books and papers published from the Missouri Botanical Garden or by its employees, or based chiefly on work done by aid of the facilities of the Garden, from January, 1899, to December, 1903, inclusive. Rept. Mo. Bot. Gard. **15**: 87–97. 1904.
504. —— The Missouri Botanical Garden. School Sci. and Math. **8**: 98–103. *2 pl.* 1908.

505. —— A supplementary list of serial publications received at the library of the Missouri Botanical Garden. Rept. Mo. Bot. Gard. **15**: 98–129. 1904.
506. —— Variegation in the Agaveae. Wiesner Festschrift. 332–356. *pl. 6–12*. 1908.
507. —— Yuccas at the Missouri Botanical Garden. Florists' Exchange. **18**: 146. *2 ff*. 1904.
508. —— [Abstracts in North American phanerogamic botany]. Botanisches Centralblatt. 1904–1908.
509. —— [Botanical notes and reviews]. American Naturalist. 1904–1907.

Trelease, W.—See P. A. Saccardo, C. H. Peck and W. Trelease.

Contributions from the Shaw School of Botany, 20–25:—

243. **20. Harris, J. A.** Polygamy and certain floral abnormalities in Solanum. Trans. Acad. Sci. St. Louis. **13**: 185–202. *ff*. 1903.
244. **21. Harris, J. A.** The germination of Pachira with a note on the names of two species. Trans. Acad. Sci. St. Louis. **13**: 203–209. *pl. 9–11*. 1903.
510. **22. Coulter, S. M.** An ecological comparison of some typical swamp areas. Rept. Mo. Bot. Gard. **15**: 39–71. *pl. 1–24*. 1904.
511. **23. Life, A. C.** Vegetative structure of Mesogloia. Rept. Mo. Bot. Gard. **16**: 157–160. *pl. 38*. 1905.
512. **24. Harris, J. A.** The dehiscence of anthers by apical pores. Rept. Mo. Bot. Gard. **16**: 167–257. 1905.
513. **25. Harris, J. A.** The anomalous anther structure of Dicorynia, Duparquetia and Strumpfia. Bull. Torr. Bot. Club. **33**: 223–228. 1906.

CONTRIBUTORS, VOLUMES 11-20.

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